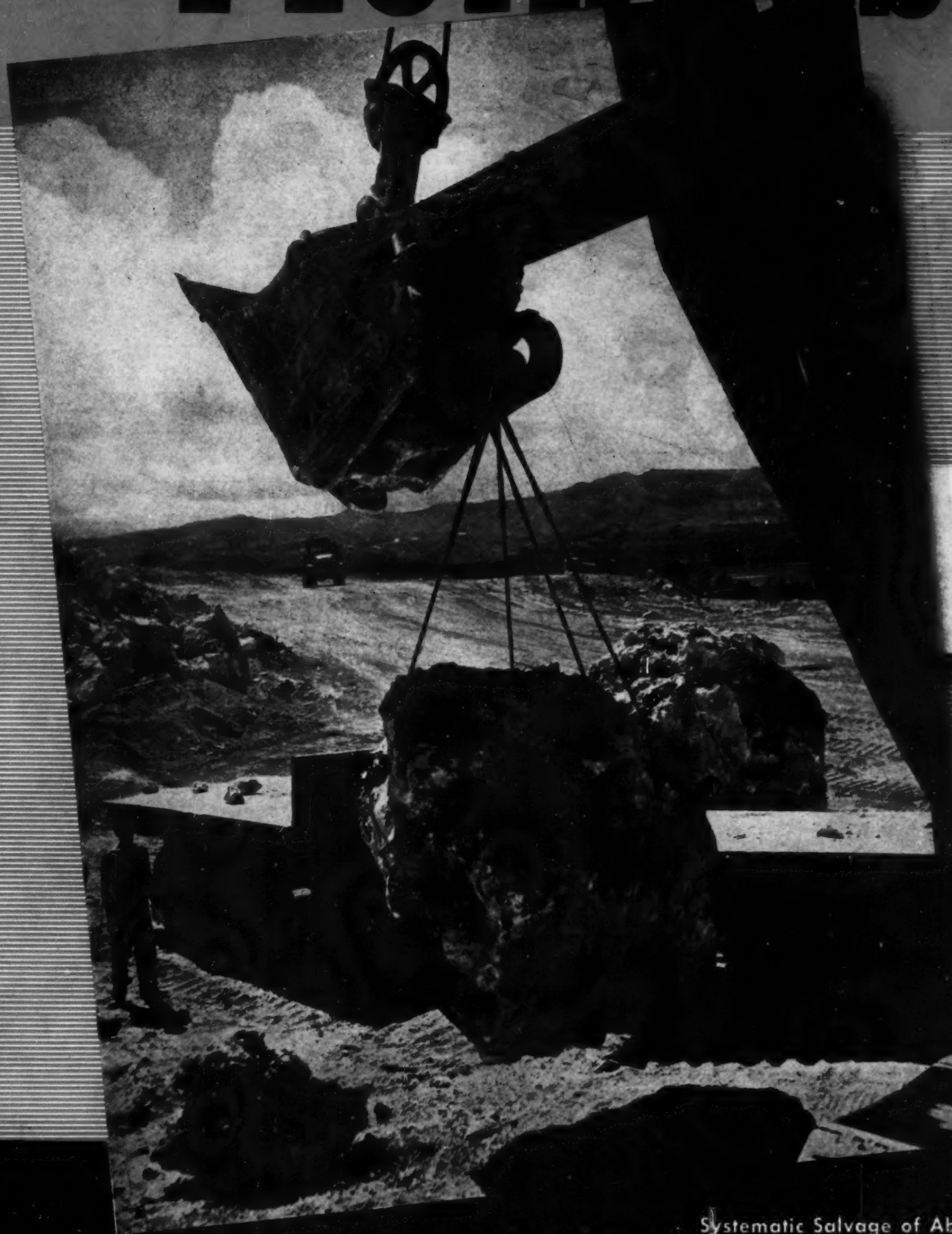


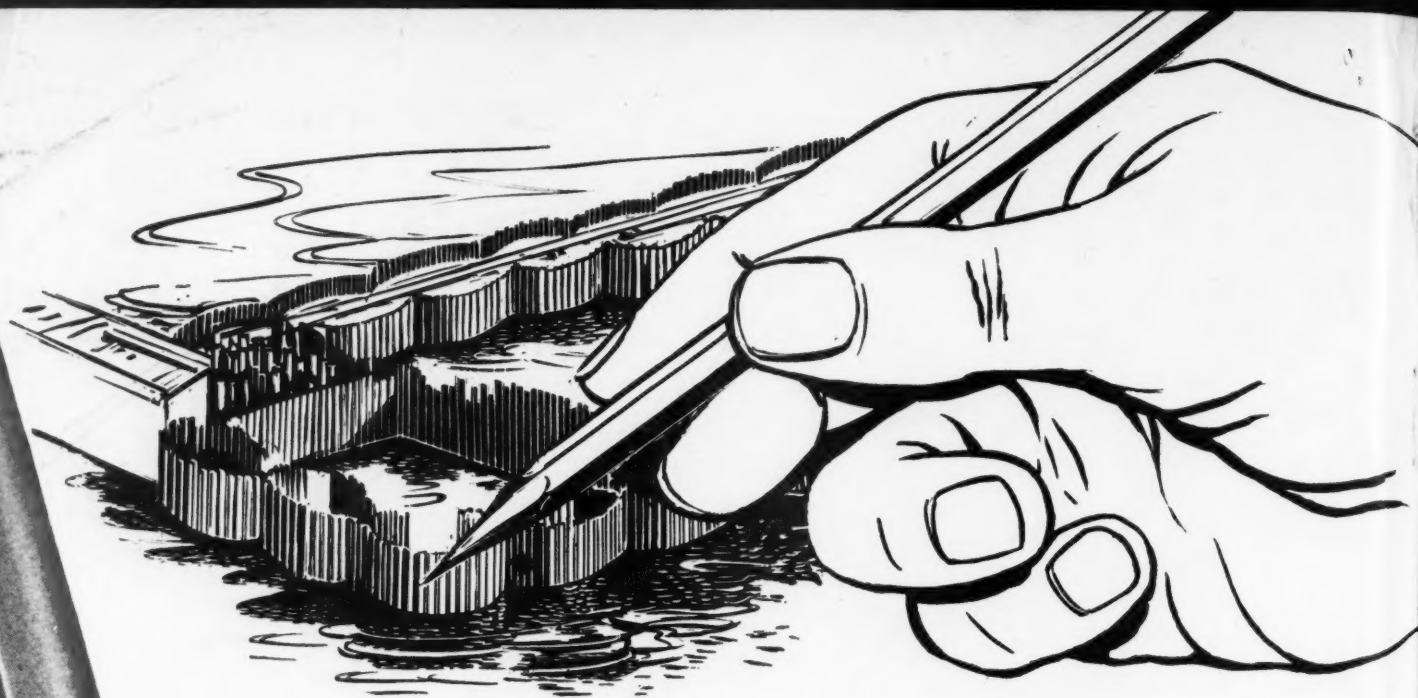
Construction Methods



WIRE ROPE SLINGS suspend
from dipper stick load large
rock for Guam breakwater

OCTOBER 1945

Systematic Salvage of Abandoned Army Camp
Factory Picked Up on Piles to Stop Settlement — by Albert DiGiacinto
Truck Mixers Furnish Concrete for Atomic Bomb Project — by Joseph H. Dixey
Horizontal Steam Hammer Drives Steel Bars Through 100 Ft. of Fill
State Maintenance Improves 50,000 Miles of County Roads — by W. Vance Baise



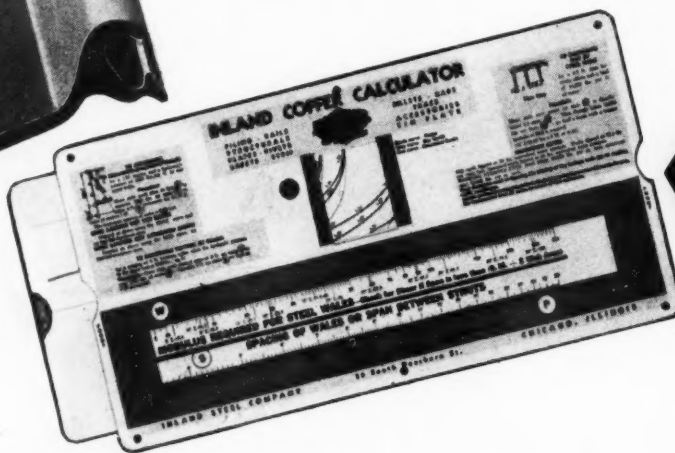
Inland Piling . . .

offers definite advantages for
efficient coffer dam construction!

Inland steel sheet piling is scientifically designed to drive freely and to produce water-tight piling jobs. Accurately rolled of special steel, it can be driven, pulled and redriven many times.

Ability to produce uniform high quality piling is only a part of Inland service. From the earliest plans for a job to completion of the project, Inland engineers cooperate on design, method, or in any other way that may prove helpful.

Inland can furnish wales, tie rod, and other accessories in conjunction with quotations on sheet piling. We also roll other forms of steel often used on piling jobs—H piling, structural shapes, Hi-Bond reinforcing bars, 4-way safety floor plate, etc.



We have recently designed the Inland Coffey Calculator. This device cuts hours from the time required to figure piling jobs. We will be pleased to send one to engineers engaged in this type of work.

INLAND STEEL CO.

38 South Dearborn Street, Chicago 3, Illinois

Sales Offices: CINCINNATI • DETROIT • INDIANAPOLIS • KANSAS CITY • MILWAUKEE
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Principal Products: BARS • FLOOR PLATE • PILING • PLATES • RAILS • REINFORCING BARS • SHEETS • STRIP • STRUCTURALS • TIN PLATE • TRACK ACCESSORIES

CURRENT JOBS and Who's Doing Them

BUILDINGS

Public—Low bid of \$5,166,600 for Naval administration and laboratory building at Inyokern, Calif., was received from **Peter Kiewit Sons Co.**, of Los Angeles. **Gust K. Newberg Construction Co.**, of Chicago, Ill., is low bidder on \$4,493,763 hospital at Hines. **Foster & Creighton**, of Nashville, Tenn., submitted low bid of \$2,544,000 on hospital at Memphis, Tenn. Low bidder on \$1,837,000 veterans' buildings at Legion, Tex., is **Robert McKee**, of El Paso. Contract for diagnostic treatment building at Elgin, Ill., went to **W. E. O'Neill Construction Co.**, of Chicago, for \$1,173,000. Housing units at Camden, Ark., will be built by **Forcum James Co.**, of Memphis, Tenn., for \$1,389,200. **Bird Construction Co., Ltd.**, of Winnipeg, Man., has \$1,350,000 housing contract. **Smith Bros. & Wilson, Ltd.**, of Vancouver, B. C., will build houses in Vancouver for \$1,125,000.

Industrial—Plant at Syracuse, N. Y., will be built by **Walsh Construction Co.**, of New York, for an estimated \$10,000,000. Contract for \$7,775,000 building at Houston, Tex., was awarded to **W. S. Bellows Construction Co.**, of Houston. **C. W. Cole Engineering Co.**, of South Bend, Ind., is low bidder on \$6,000,000 plant at La Porte. **George A. Fuller Co.**, of New York, N. Y., has \$5,000,000 contract for research center at Linden, N. J. Plant at Angleton, Tex., will be built by **Stearns-Rogers Mfg. Co.**, of Denver, Colo., for \$4,500,000. **Merritt-Chapman & Scott Corp.**, of New York, N. Y., has \$3,000,000 contract for plant at Elkton, Va. **Welso Construction Co.**, of Chicago, Ill., will build \$2,000,000 factory at Chicago. Plants at Bound Brook, N. J., will be built by **Turner Construction Co.**, of New York, N. Y., for \$2,000,000. **Wermuth, Inc.**, of Fort Wayne, Ind., has contract for \$1,250,000 plant.

Commercial—Office building at New York, N. Y., will be built by **John W. Harris Associates, Inc.**, of New York, for an estimated \$6,000,000. **Starrett Bros. & Eken**, New York, N. Y., has \$3,500,000 contract for store addition in Brooklyn. **C. F. Haglin & Sons Co.**, of Minneapolis, Minn., has \$2,500,000 store remodeling contract.

HEAVY CONSTRUCTION

Pipeline in Texas and Louisiana will be built by **O. C. Wittaker Co.**, of Houston, for approximately \$7,150,000. Runway paving contract at Idlewild, N. Y., was awarded to **Goll & DeFelice**, of Brooklyn, for \$1,896,951. Navy contract for earthwork, pipeline and structures at San Diego, Calif., went to **Guy F. Atkinson Co.**, Long Beach, for \$1,164,885.

HIGHWAYS

Among recent highway contract awards are the following: Connecticut: \$611,940 to **D. V. Frione & Co., Inc.**, of New Haven, Illinois: \$502,449 to **O'Connor Construction Co.**, of Springfield; and \$503,917 to **Powers-Thompson Construction Co.**, of Joliet. Indiana: \$394,772 to **Bontrager Construction Co.**, of Elkhart. Massachusetts: \$204,127 to **Kelleher Corp.**, of Turners Falls. New York: \$497,994 to **L. Mayersohn**, of Albany. North Carolina: \$202,955 to **E. W. Grannis Co.**, of Fayetteville. Pennsylvania: \$490,000 to **Hempt Bros.**, of Camp Hill; \$364,983 to **C. W. Good, Inc.**, of Lancaster; and \$412,933 to **Central Pennsylvania Quarry Stripping & Construction Co.**, of Hazleton. Texas: \$420,904 to **E. W. Hable & Son**, of Corsicana; \$246,893 to **L. H. Lacy Co.**, of Dallas; and \$241,150 to **D. R. Cloud**, of San Antonio. Virginia: \$372,012 to **Ralph E. Mills Co.** and **W. N. Jackson**, of Roanoke; and \$284,309 to **W. E. Graham & Sons**, of Cleveland, N. C. Washington: \$255,763 to **A. Osberg**, of Seattle.

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Construction Methods

A Pictorial Survey of Current Practice, Equipment and Materials

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ROBERT K. TOMLIN, Editor

Editorial Staff: Vincent B. Smith; Donald D. King; Nelle Fitzgerald;

Patricia McGerr; Paul Wooton and A. N. Carter (Washington)

N. A. Bowers (San Francisco)

OCTOBER, 1945

THE *How* OF IT

For the benefit of readers concerned with the practical application of method or equipment the following references are to articles or illustrations in this issue that tell:

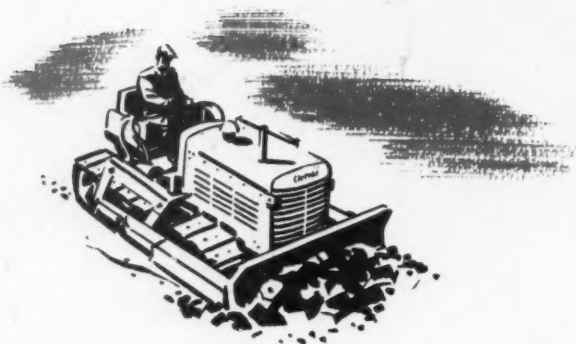
- How **STEEL MAST** weighing 90 tons was raised by A-frame and hoist for Grand Coulee cableway —p. 75
- How **COORDINATED TRANSIT-MIX PLANT** furnished large concrete volume for atomic bomb project —p. 78
- How **SEABEES ON MIDWAY** placed 2,000-ft. outfall sewer in 12 hours —p. 81
- How **HORIZONTAL PILE HAMMER** drove heavy steel tierods through shipyard fill —p. 82
- How **BREAKWATER** was built at Guam by Seabees using large earth-moving equipment —p. 86
- How **ARC-WELDED BUILDING** required 22 percent less steel —p. 89
- How **RADAR STATIONS** used tall steel towers to guard Britain's coast —p. 90
- How **FACTORY UNDERPINNING** was installed without interrupting manufacturing process —p. 92
- How **LIGHT PREFABRICATED BUILDINGS** were erected to store Engineer equipment in Italy —p. 94
- How **RADIANT HEATING** was installed at factories to keep pavement clear of ice and snow —p. 95
- How **UNDERWATER WELDING** was accomplished by means of mild steel electrode with special coating —p. 96
- How **POWDER MAGAZINES** were built by specialist crews following fast schedule —p. 98
- How **DISMANTLED ARMY CAMP** released critical materials for new construction —p. 100
- How **DISTRIBUTOR ON RAILROAD CAR** applied asphalt to track ballast —p. 103
- How **SECONDARY ROADS** are maintained by state highway department —p. 104

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Quality is fundamental to every production step in the modern Oliver "Cletrac" plant . . . in materials, workmanship, and equipment.

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A Tocco induction heat-treating machine for hardening track shoe pins in the Oliver "Cletrac" plant.

THE JOB JESTER

CARTOONS DRAWN FOR CONSTRUCTION METHODS



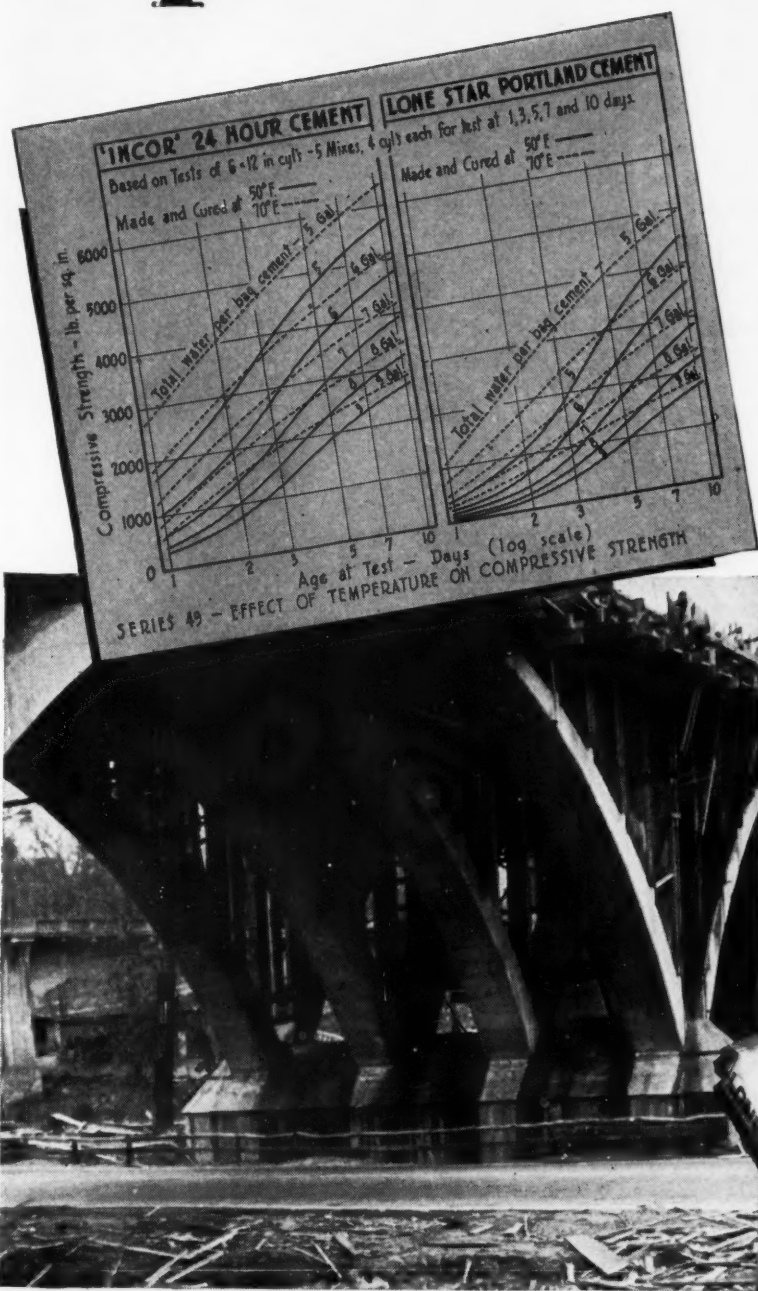
"He's the only one we've got that will tackle a 90 footer."



"Shucks, these ain't no fun, Boss. Why don't we build a ponton bridge?"

FASTER-CURING 'INCOR'

Speeds Fall Jobs



ADD special Fall advantages to year-around 'Incor' time- and form-cost savings, and you've got a combination that can't be beat. At this season, nights turn cold suddenly... temperatures often average about 50 degrees... hardening is retarded, and unprotected concrete is exposed to freezing risk. That's why 'Incor' is a big plus. Without protection, at 50 degrees, 'Incor' concrete attains stripping strength, is safe from sudden freeze, 2 or 3 days sooner. By using 'Incor' 24-Hour Cement you—

MAINTAIN STRIPPING SCHEDULES
PREVENT JOB SLOW-DOWN
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Plan and build with 'Incor'* 24-Hour Cement. Write us at 342 Madison Ave., New York 17, for copy of "Winter Concreting."

*Reg. U. S. Pat. Off.

On bridges and structures—wherever repetitive use of forms is possible—dependable 'Incor' high early strength cuts form costs, keeps jobs on schedule, helps safeguard against frost hazard. Use 'Incor' this Fall and see for yourself.



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Offices: ALBANY • BIRMINGHAM • BOSTON • CHICAGO • DALLAS • HOUSTON • INDIANAPOLIS • JACKSON, MISS.
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LONE STAR CEMENT, WITH ITS SUBSIDIARIES, IS ONE OF THE WORLD'S LARGEST CEMENT PRODUCERS: 15 MODERN MILLS, 25-MILLION BARRELS ANNUAL CAPACITY

How to make Better Time...

CABLE trouble can play the devil with construction schedules. That's why wire rope performance is one of the most important factors in determining dirt-moving profits. The better the cable, the more efficient becomes your equipment . . . the faster your job moves along.

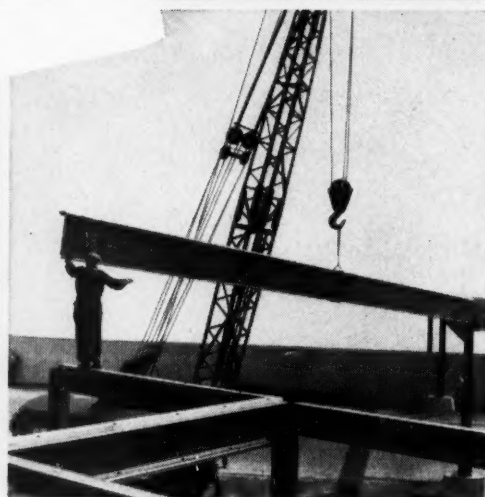
TIGER BRAND Excellay Preformed Wire Rope doesn't have to be broken in. You can put it to work at once. Its *preformed* construction gives it *greater* fatigue resistance. You get top production because each strand bears its full share of the load. This superior cable runs true in sheave grooves, spools evenly at all speeds under light or heavy loads.

Important, too, is **TIGER BRAND's** safety advantage. Crown wires lie flat and in place even when broken . . . do not stick out to tear hands and clothes of your men.

Prepare now to use **U.S.S. American TIGER BRAND Excellay Preformed Wire Rope** on your next job. Specify it for new equipment . . . re-rig your old equipment with it.



*Excellay
Preformed*



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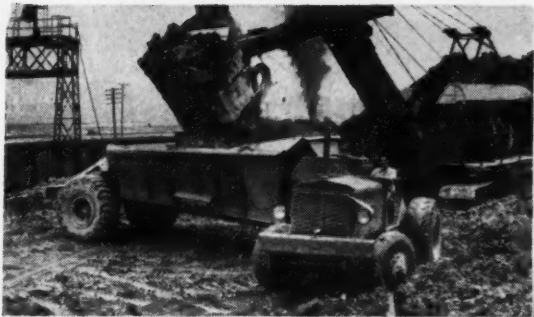
United States Steel Export Company, New York

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U.S.S. AMERICAN
TIGER BRAND *Wire Rope*

You Can Do A Wider Range of Work with **EUCLIDS**



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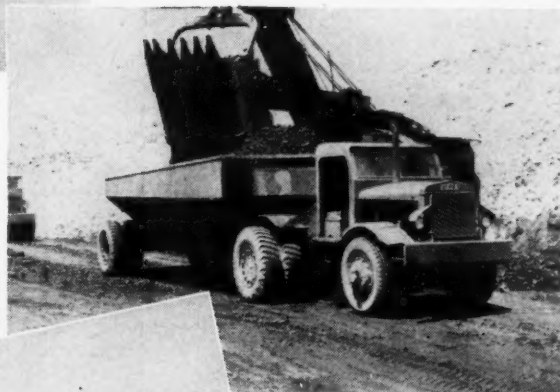
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NEW...FULL-TIME OPERATING EFFICIENCY

with FAWICK CLUTCHES



The newest improved type of shovel is Fawick equipped—for more dependable, more economical operation.

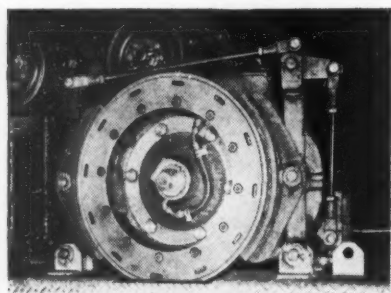
Keep them going—keep them free from down time—that's what Fawick Clutches do for earth-moving and material-handling machines.

This new Clutch controls power and torque through a cushion of rubber and air. It has no springs, arms or levers—requires no adjustments, no lubrication—has low maintenance costs.

Let us help you engineer Fawick Airflex Clutches for your machines. Book on request.

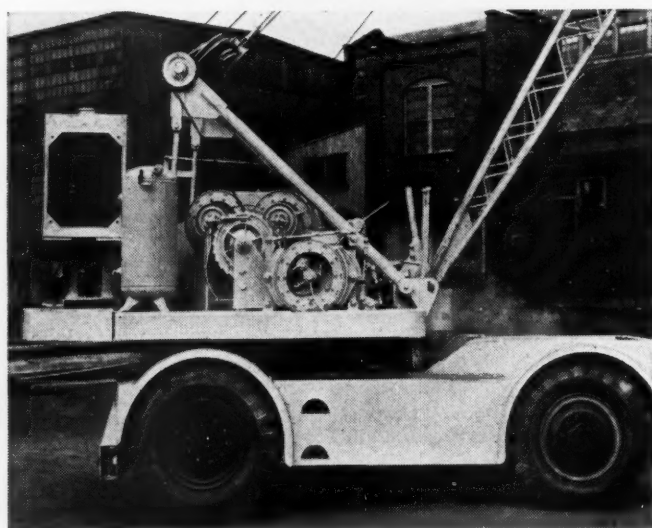
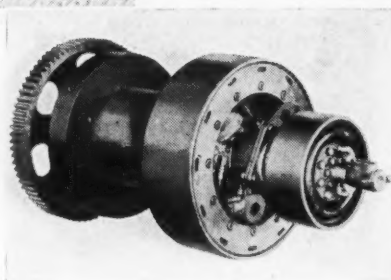


Fawick Clutches are providing new efficiency for shovels, cranes, draglines and hoists.

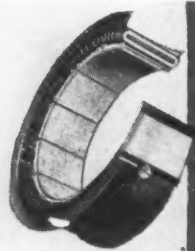


Main propel mechanism of the Shovel above—Fawick equipped.

Hoist drum assembly of the Shovel above—Fawick equipped.



Seven Fawick Clutches are used on the new Byers $\frac{1}{2}$ cu. yd. "Traveler".



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There are men with practically every skill you could possibly want, *and we mean skill*. Those skills are good enough to lick the toughest job the world ever saw. Use them to help you lick the business problems ahead.

These men are blue chips.

Published in cooperation with the War Advertising Council with the gratitude and pride all Americans feel for our fighting men
—by The B. F. Goodrich Company.



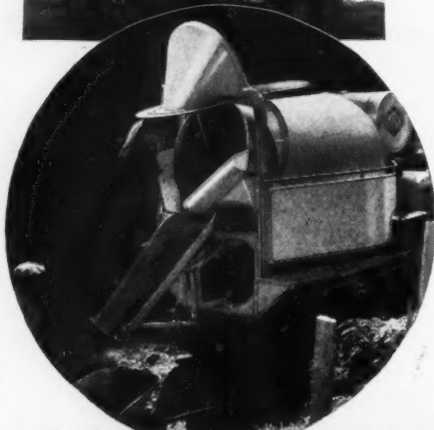
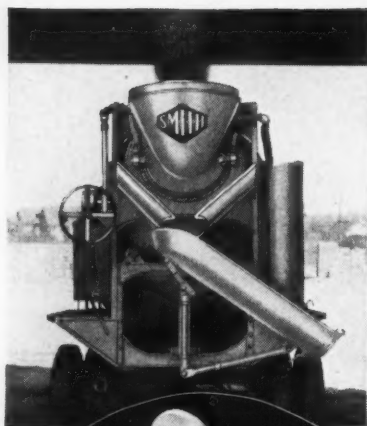
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REMEMBER! It's what the Truck Mixer CAN DO... that really counts!

Faster gravity flow charging with Smith-Mobile's big, roomy feed chute. No obstructions in chute. No hatch to open or close. Driver can stay in cab.

Faster and better mixing. Shrinking and mixing start the instant batch enters drum, because drum rotates during charging operation. Sealing door can be opened wide during mixing cycle. You can look in drum and actually SEE what's going on.

Faster delivery of concrete into forms. High discharge. Permits steeper and longer distributing spout. Covers greater area even with dry concrete. Pours concrete directly into high forms, hoppers, buckets or carts. No hoist or ramp required.



Truck mixer sizes have frequently changed, and will continue to change. But right now, you're primarily interested in what the truck mixer can DO for you . . . how it performs in actual every-day operation.

Smith-Mobile is the ORIGINAL High Discharge Truck Mixer that has long proven its ability to outperform any other truck mixer on the market. Pioneered by Smith 8 years ago and thoroughly job-tested, Smith-Mobile has set the pace for the industry. Constant improvements and refinements have been added, and are being added, from time to time. Today, Smith-Mobile is acclaimed by ready-mixed operators everywhere as the LAST WORD in truck mixer design.

So play safe! Don't take chances with untried truck mixers. Specify the tried and proven Smith-Mobile. Available in four sizes.

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THE ORIGINAL HIGH DISCHARGE Truck Mixer and Agitator

A BETTER TRUCK CRANE *for Tougher Service...*

A Northwest Truck Crane setting the foremast of the old Battleship Oregon as a monument in Portland, Ore.

Truck Cranes always take a beating! You want yours to be ready to go at a moment's notice when you need it. You'd like to be sure you had, in it, the same dependability you find in your Crawler Cranes and Shovels—the kind of design and construction you find in a real Rock Shovel.

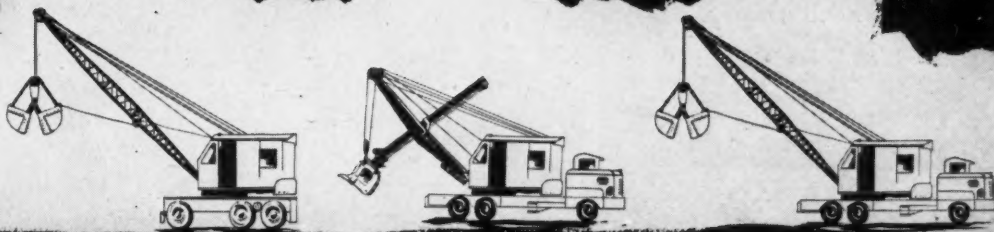
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They bring you the same proved Northwest advantages found in Northwest Crawler Shovels and Cranes plus Truck Crane advantages, developed by Northwest engineers.

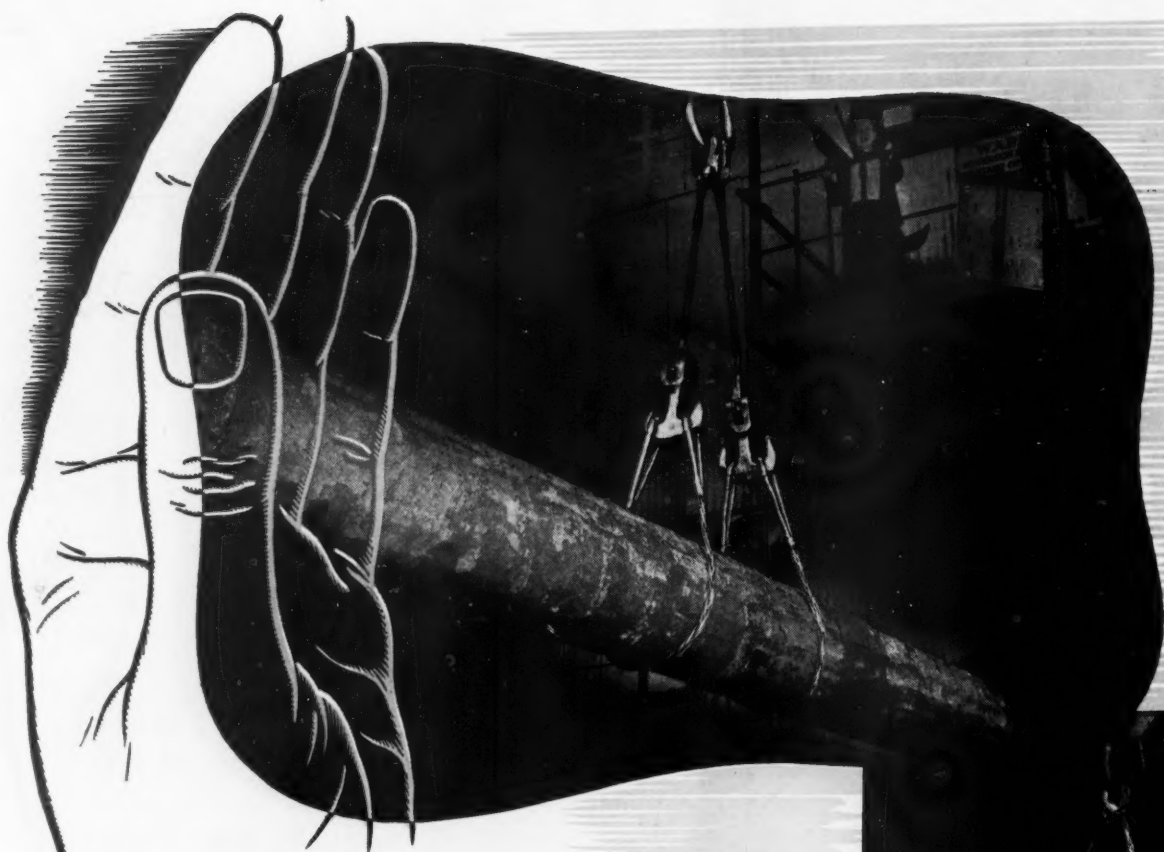
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Wait until you have seen
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Rubber Tired Line of
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Shovels or Wagon
Cranes Before You Buy!



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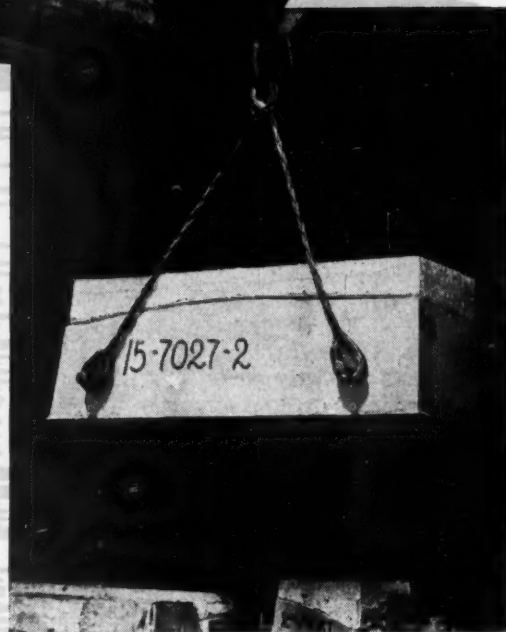
**Materials move quickly...
smoothly... carried by flexible
YELLOW STRAND BRAIDED SLINGS***

When a job's moving on schedule, it's costly to have it slowed by sling equipment. What you want—in factory, shop, warehouse or yard—is *flow* in the handling of sling loads. Yellow Strand Braided Safety Slings promote this smoothness. Their flexibility, kink-resistance and light weight enable operators to give each lift more accurate control... to run a series of pickups without wasted time or motion.

Patented *braiding* puts added limberness into long-wearing Yellow Strand Wire Rope. The sling conforms to odd shapes, grips curved objects firmly, takes thimbles, turnbuckles and other fittings readily. Weighing less than chain, *braided* slings are easily carried, fastened and detached, using a minimum crew. Employees welcome their security on big tonnage lifts, their Manila-like convenience for small jobs.

Yellow Strand Braided Slings are practicable for loads ranging from a 40-lb. drum to a 300-ton locomotive. Send details of your application now and let B&B engineers offer a recommendation.

Broderick & Bascom Rope Co., St. Louis 15, Mo. *Branches:* New York, Chicago, Houston, Portland, Seattle. *Factories:* St. Louis, Seattle, Peoria.



RIGGERS' HAND BOOK FREE
Shows sling types, fittings,
capacities. Write for your copy.

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OSHKOSH

FOR LOW COST EARTH MOVING



• On many construction projects the cost of moving dirt determines who gets the job. With this revolutionary OSHKOSH unit, dirt can be moved over abnormal terrain, such as sand, mud, etc., at a fraction of former costs.

Today's OSHKOSH Earth Mover is the result of eight years of engineering development and on-the-job experience.

It combines the powerful diesel 4-Wheel Drive, 4-Wheel Power Steer Tractor with a semi-trailer load unit designed for quick loading, fast unloading and rapid travel.

All four driving wheels of the tractor steer, permitting a complete U-turn in 36 feet—approximately 80% of the overall length of the unit. This short turning radius and its

speed (up to 28 miles per hour) make the OSHKOSH especially efficient in hauling from a shovel. Power is distributed equally to all four tractor wheels, regardless of position, giving uniform, dependable performance under all conditions. The OSHKOSH moves dirt at substantially lower cost on both short and long hauls.

The semi-trailer can be quickly removed and the tractor used for pulling self-filling scrapers, for which it is also exceptionally efficient, due to its maneuverability and four-wheel traction.

Write for descriptive literature.

OSHKOSH MOTOR TRUCK INC.

OSHKOSH, WISCONSIN

Cable Address: "OSHMOTOR" OSHKOSH



"True Saving Is a Matter of Right Selection"

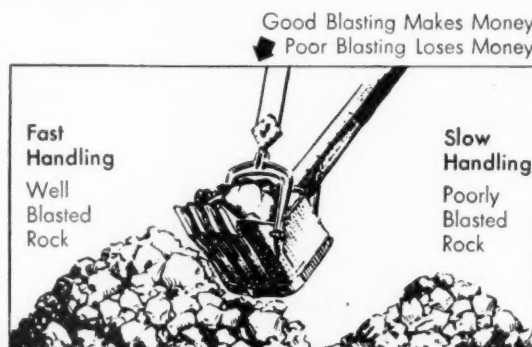


... advice that applies to blasting, too

Not what you *save*, but what you *get*—that's what counts in tailoring or blasting.

Any explosive that gives you poor fragmentation, resulting in higher shovel, transportation or crusher costs, is an *expensive* explosive no matter what its price. Conversely, an explosive that keeps shovels full, trucks loaded, men moving, is a sound investment from start to finish.

It's all a matter of using the right explosive in the right place, in the right amount. It does not necessarily mean more explosives. It is the right handling of the whole blasting procedure that counts. And that's where your Atlas Representative can help you—selecting from 120 different grades and kinds, advising on methods for the best results.



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EXPLOSIVES

"Everything for Blasting"



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**The IMPRINT of the
Tire that PAYS OFF...
the Firestone ROCK GRIP**

YES, there is a tire that pays off — it's the Firestone Rock Grip. It pays off because it reduces operating costs — puts more money on the profit side of the ledger.

Look at that Rock Grip tread. It takes hold and out-pulls any other off-the-highway tire made. Tough? It has plenty to spare for the toughest job. And like other Firestone Off-the-Highway tires, the Rock Grip body can be retreaded many times. That is the kind of a tire that saves you money.

The next time you buy Off-the-Highway tires, make them Firestone tires. Then let your records show you how your tire operating costs go down.



For the best in music, listen to the "Voice of Firestone" every Monday evening over NBC network.

Copyright, 1945, The Firestone Tire & Rubber Co.

A.N.S.
EARTH MOVER

ROCK
GRIP

GROUND
GRIP



Firestone
OFF-THE-HIGHWAY TIRES

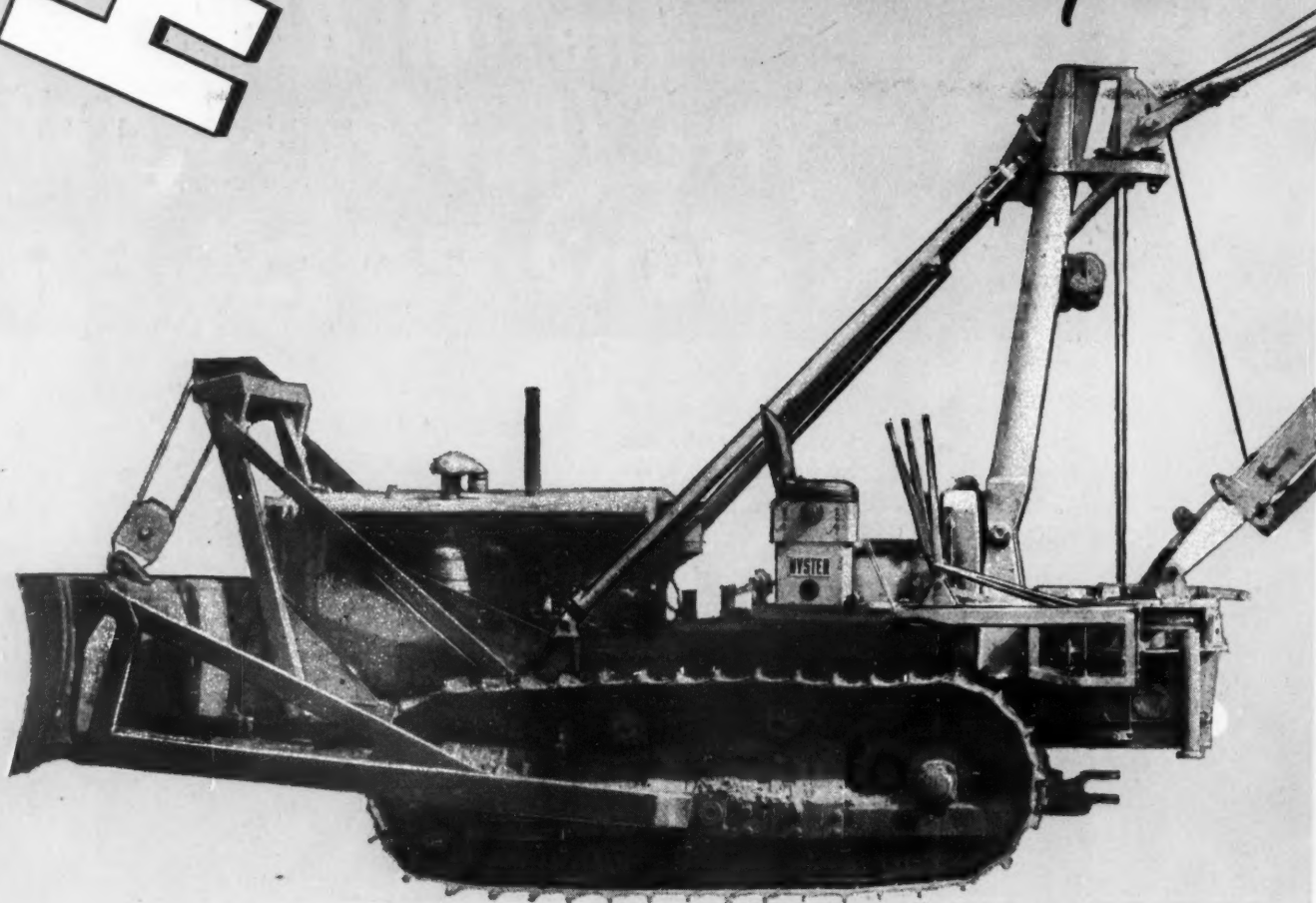
HYSTER proudly presents the



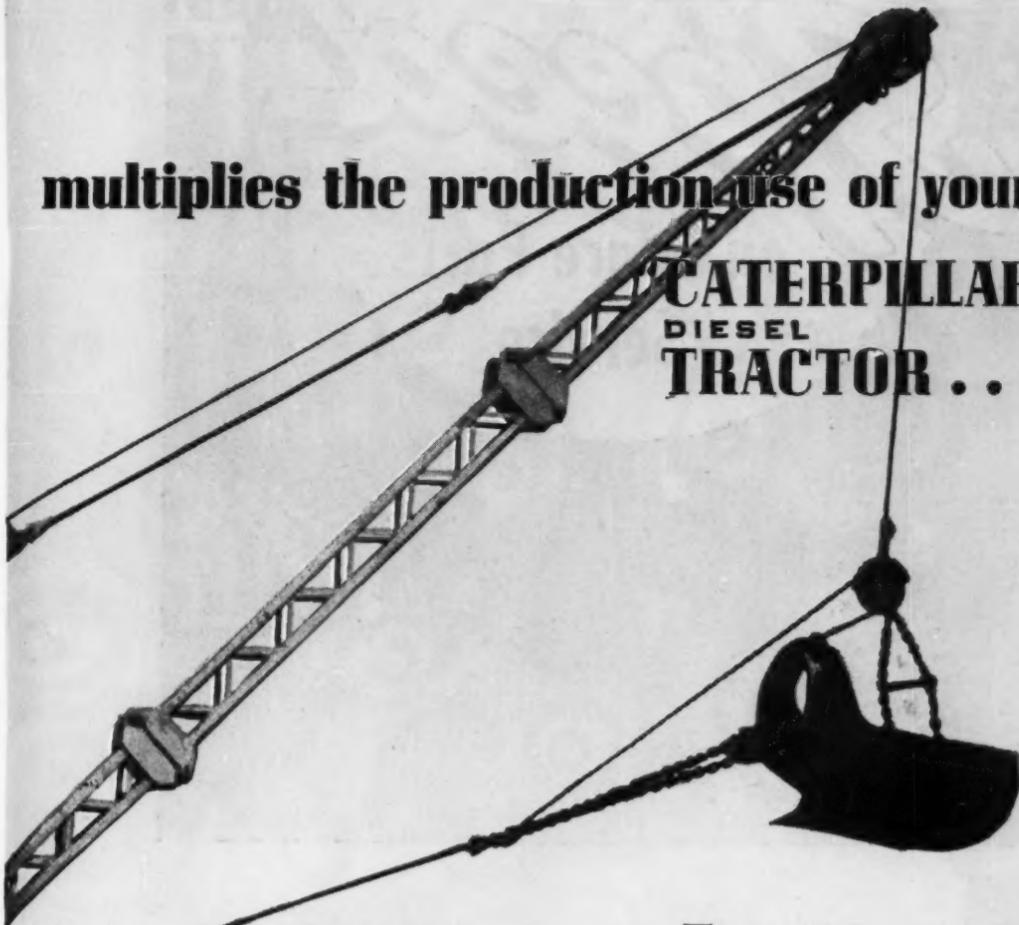
HYSTAWAY

A DRAGLINE, CLAMSHELL
AND CRANE COMBINATION
for use with Track-Type
Tractor and Bulldozer...

All in One Working Unit



Sold and serviced by "Caterpillar" dealers
and distributors throughout the world.



**multiplies the production use of your
"CATERPILLAR"
DIESEL
TRACTOR . . .**

SIZES. Available for "Caterpillar" models D6, D7, D8.

DRAGLINE AND CLAMSHELL.

Handles (on a D7) $\frac{1}{2}$ cu. yd. dragline bucket; $\frac{3}{8}$ cu. yd. digging clamshell or $\frac{1}{2}$ yd. rehandling clamshell. Other models in proportionate capacities.

CRANE. Swinging live boom, with maximum lifting capacities in any position.

MOUNTING. On in 2 hours (with 2 men); off in 1 hour.

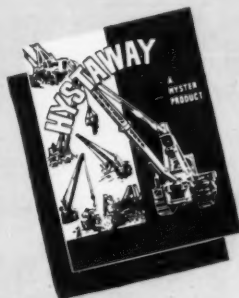
MOBILITY. Full tractor mobility is retained. Crawler track oscillation is not impeded. Tractor rigidity when desired is accomplished by crank control at masthead.

OPERATION. Conventional shovel and crane controls. 240° swing at speed of 4.5 RPM.

THIS is the most important product announcement Hyster Company has made in the 16 years we have specialized in building tractor equipment.

The addition of a Hystaway to a "Caterpillar" track-type tractor gives you *one piece* of production machinery that combines tractor — bulldozer — dragline, clamshell and crane.

Back of Hystaway lies the best engineering skill in the tractor equipment business . . . Years of field tests in various sections—under all working conditions—have proved Hystaway's performance, stamina and versatility.



READY FOR YOU . . .

A completely illustrated booklet on Hystaway—how it's built—what it does—how it does it. Write for your copy.

HYSTER COMPANY 2921 N.E. Clackamas, Portland 8, Ore.
1821 North Adams, Peoria 3, Illinois



Super Speed

on Spare Parts
Service

CLEVELAND ROCK DRILLS AND ACCESSORIES

AIR HOSE
AIR VALVES
AUGER DRILLS
CLAY DIGGERS
COLUMNS AND
TRIPODS
DRIFTERS
HOSE COUPLINGS
JUMBO RIGS

LINE OILERS
MOILS AND CHISELS
PAVING BREAKERS
SHEETING DRIVERS
SINKERS
STOPERS
SUMP PUMPS
TAMPERS
WAGON DRILLS

HERE at Cleveland we are justly proud of our remarkable service on spare parts, and want rock drill users to know how readily we can handle their requests.

In the first place, we have spare parts in stock for every Cleveland model which we have made on a production basis during the last twenty years.

Secondly, we are able to ship these parts to you not later than the next day after receipt of your order.

Furthermore, they are guaranteed to fit, and made in the well known Cleveland quality—they stand the gaff!

To aid you in ordering spare parts, send us now the Model and Serial Numbers of your Cleveland rock drills and the correct Parts Lists will be sent by return mail.

LEADERS IN DRILLING EQUIPMENT....

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Birmingham 1, Ala.	Lexington 19, Ky.	Salt Lake City 1, Utah
Butte, Mont.	Los Angeles 11, Calif.	San Francisco 3, Calif.
Denver 2, Colo.	Newton Highlands 61, Mass.	St. Louis 3, Mo.
El Paso, Texas	New York 6, N. Y.	Wallace, Idaho
Ironwood, Mich.	Philadelphia 30, Pa.	Washington 5, D. C.

CANADIAN DISTRIBUTORS

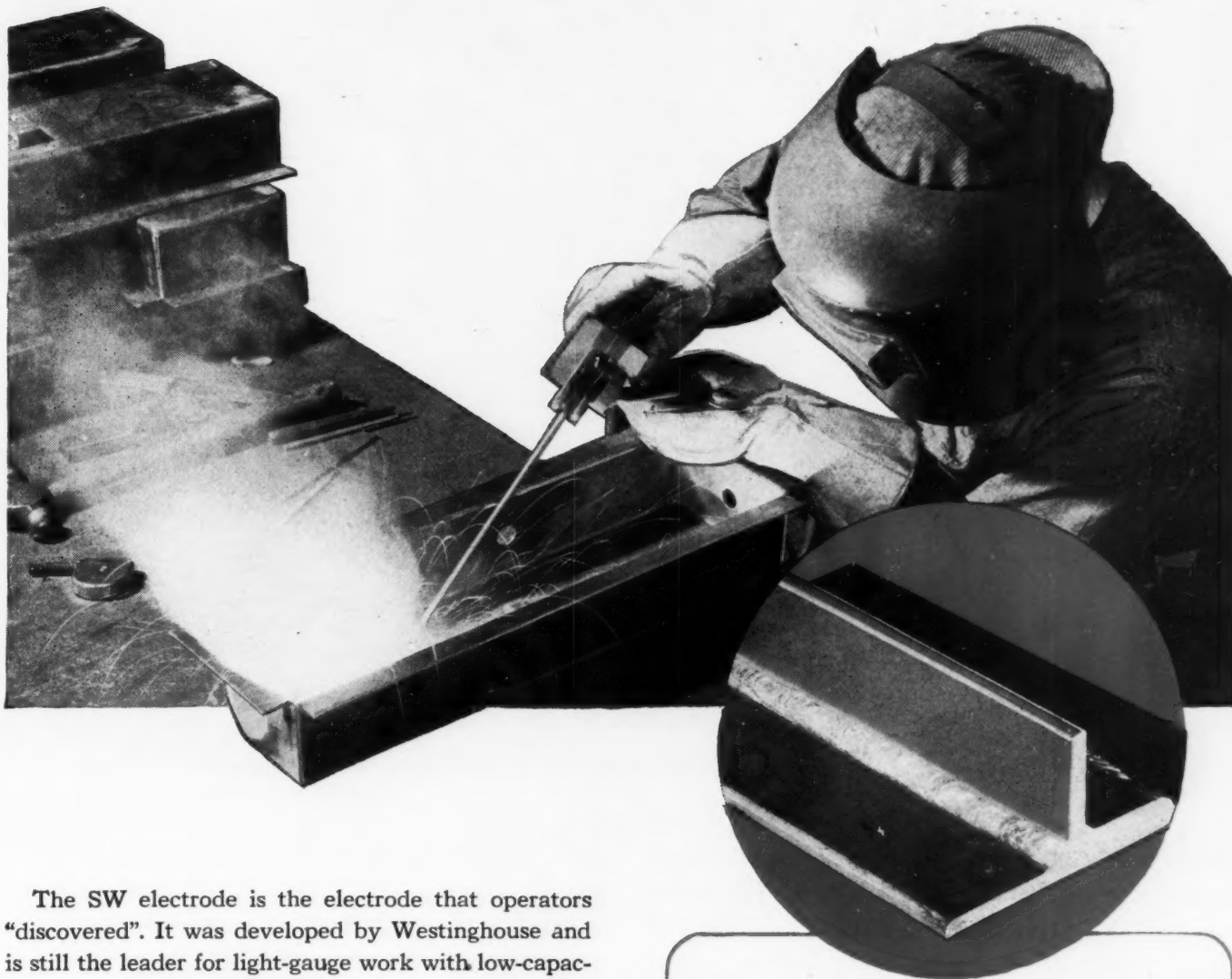
Purves E. Ritchie & Son, Ltd., 658 Hornby Street, Vancouver, B. C.
Industrial Machinery Co., Ltd., 163 N. Water St., Halifax, Nova Scotia

CLEVELAND ROCK DRILL DIVISION

THE CLEVELAND PNEUMATIC TOOL COMPANY

CABLE ADDRESS: "ROCKDRILL"
CLEVELAND 5, OHIO

SMOOTH, UNIFORM METAL TRANSFER WITH **Flexarc SW electrodes**



The SW electrode is the electrode that operators "discovered". It was developed by Westinghouse and is still the leader for light-gauge work with low-capacity, a-c welding machines. But its use has gone far beyond this because of the excellent results obtained with a-c or d-c machines on general-purpose work.

With either type of current, beads are clean, smooth and flat. Uniform metal transfer makes the SW electrode outstanding for production of sound welds in both overhead and vertical positions, and with special treatment this electrode is unexcelled for underwater cutting and welding. It covers the general field of mild steel welding and you can expect excellent results when used with any of the following metals: low and medium-carbon steel; low alloy, high-strength steel; copper-bearing steel; wrought iron; low and medium-carbon cast steel.

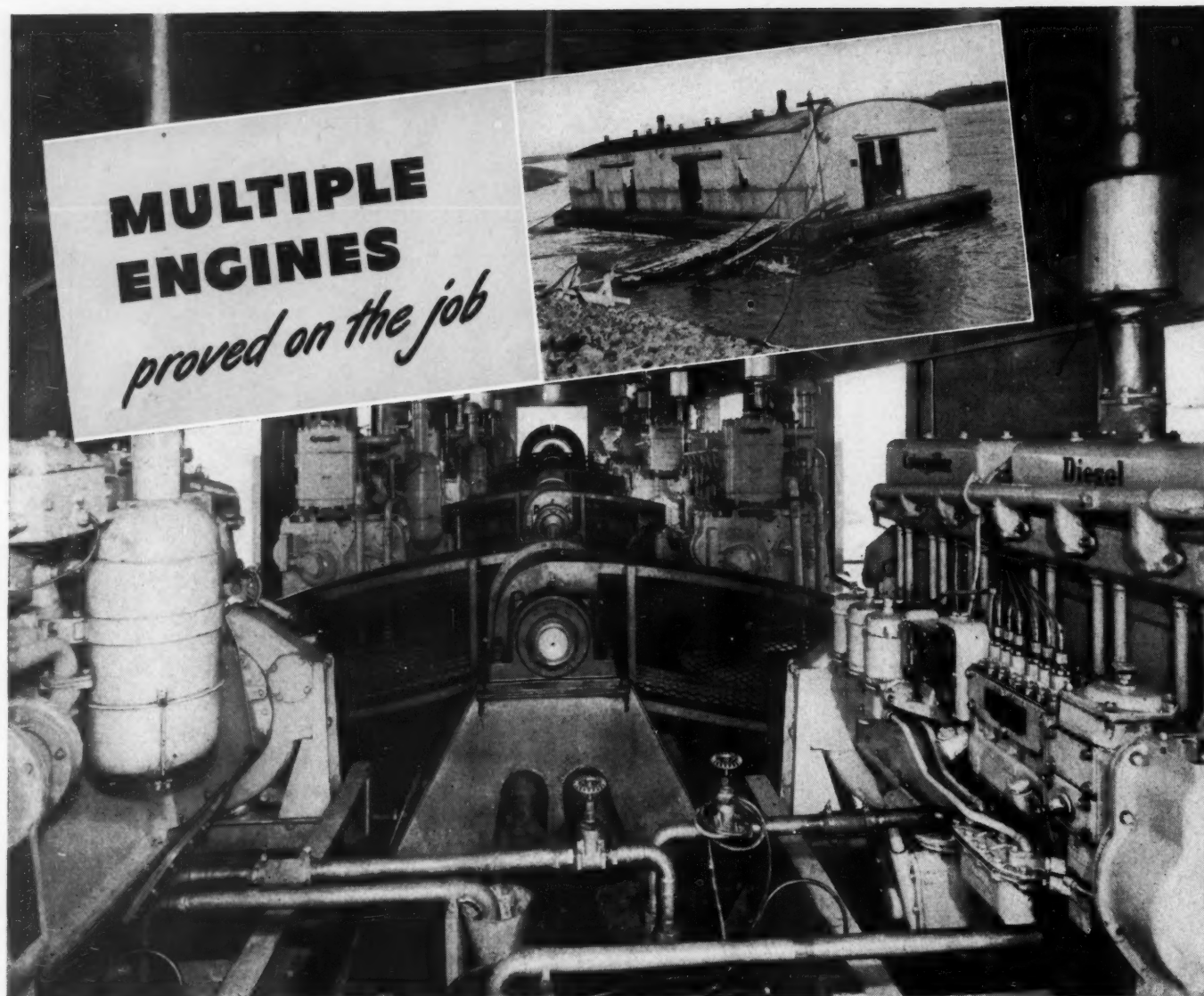
For more information about this quality electrode send for folder DD-26-644. Westinghouse Electric Corporation, Box 868, Pittsburgh 30, Pa. J-21337

ONE OF THE WESTINGHOUSE "BIG 5" Meets AWS and ASTM Specs. E-6013-12

- A-c or d-c arc easy to strike and maintain
- Low spatter loss
- Easy slag removal
- Smooth, closely rippled weld beads
- Minimum "burn-through" on thin sections
- Easy to handle in vertical and overhead positions
- Free from slag interference, when welding vertically down



Westinghouse
PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE
FLEXARC SW ELECTRODES



DIESEL POWER for variable loads, through multiple-engine hook-up, is nothing new with "Caterpillar." Fourteen years show hundreds of such "Caterpillar" Diesel installations, in all types of industries, where their advantages are being proved daily.

In the installation pictured here, TEN "Caterpillar" Diesel D13000 Engines are all belted to a single shaft to drive a 700 KVA generator supplying power for a 600-hp. motor generator in a tower machine used in levee building. Any eight of the engines can carry the full load—thus affording a high ratio of

standby power. Partial loads are easily handled by cutting out any engines not needed. This "floating power house" can also supply emergency power to flood-stricken communities.

Economical power in multiple "packages" which in any combination or grouping can readily be matched to varying loads—that's what leads to greater production, steadier going, lower costs, better profits when "Caterpillar" Diesels are put on the job.

CATERPILLAR TRACTOR CO. • PEORIA, ILLINOIS

• SIX SIZES—34 to 190 hp.—applicable to multiple hook-ups of 2 to 20 units—in many combinations of sizes.

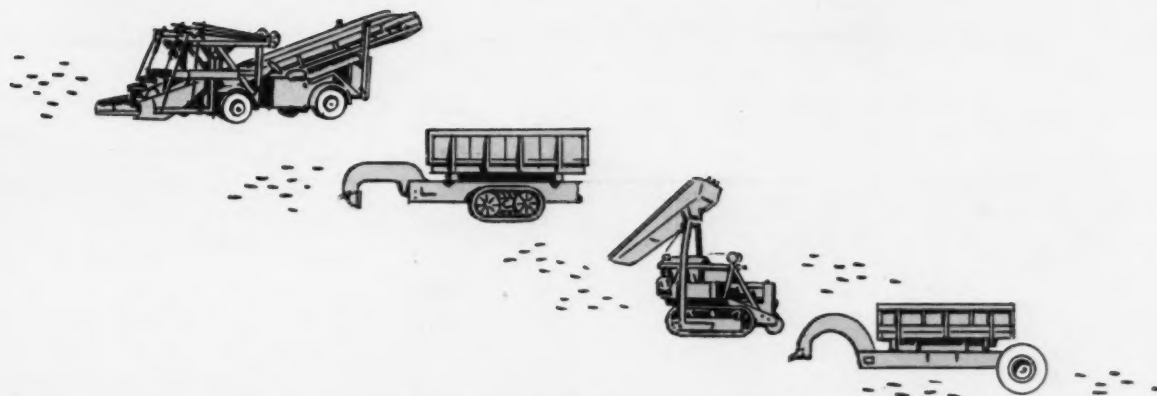
CATERPILLAR DIESEL ENGINES

REG. U.S. PAT. OFF.

TRACTORS • MOTOR GRADERS • EARTHMOVING EQUIPMENT



*The discharged veteran wears this emblem.
Remember his service and honor him.*



ANNOUNCING..

a change in name

Effective at once

ATHEY TRUSS WHEEL COMPANY

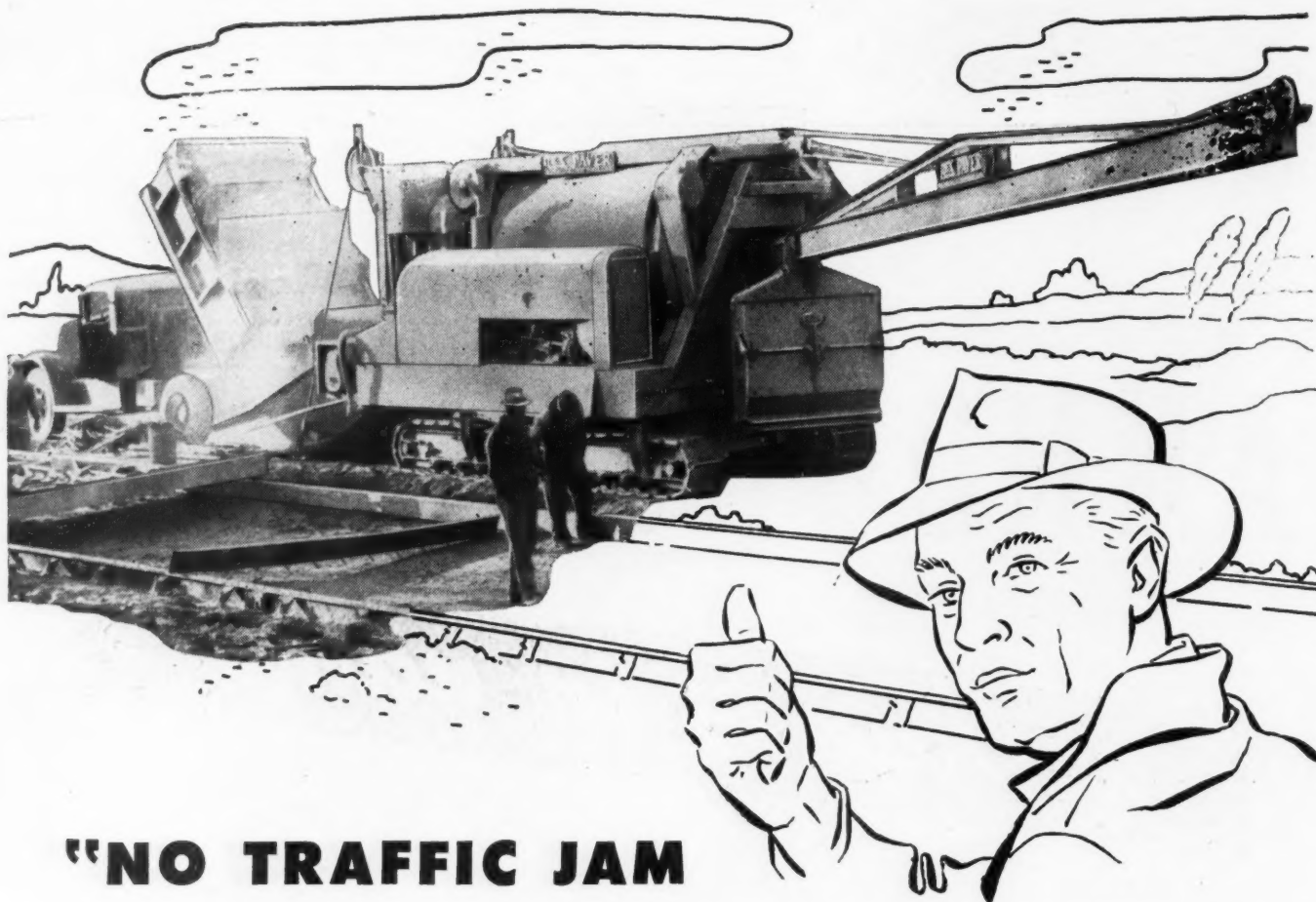
has adopted the name

ATHEY PRODUCTS CORPORATION

5631 W. 65th ST. CHICAGO 38, ILLINOIS

*And its Forged-Trak Wheels, Mobiloaders
Force-Feed Loaders and Rubber-Tired
Trailers will bear the Trade-Mark*

"APCOR"



"NO TRAFFIC JAM WITH THAT SKIP!"

"That Rex skip really keeps us moving right ahead because it gives us those extra few seconds of loading time that mean more batches per hour," says a well-known paving contractor.

Why, it's practically a "one-man ground crew" that kicks the batch into the drum almost faster than you can say "Jack Robinson." Then—zingo—the skip is back on the ground again and it stays there just long enough to give the exact time needed for dumping the next batch into the skip.

The operator is *not* required to turn the water on or off manually, he can drop the skip *faster* . . . permit it to remain on the ground those few seconds longer that mean more orderly loading, more yards per day.

And it's all made possible by the famous Rex Mechanical Man that automatically controls the batch transfer and entire mixing cycle right to a split second. It opens and closes the discharge door—it opens and closes the transfer door—it controls the water and it starts the skip upward—all in perfect timing and with valuable seconds saved.

RELY ON YOUR Rex Distributor. He handles the complete line of Rex equipment for speeding up the mixing, hauling and placing of concrete and the moving of water. See him for Pumps, Mixers, Pavers, Moto-Mixers and Pumpcretes. You'll find him always ready and willing to help you locate new and used equipment, and to help you keep your present equipment in top running order.

CHAIN BELT COMPANY of MILWAUKEE

1664 W. Bruce Street, Milwaukee 4, Wisconsin



CONSTRUCTION MACHINERY



PUMPS



PAVERS



PUMPCRETES



MOTO-MIXERS



MIXERS



THERE'S BEEN A BIG CHANGE

★ Just try to persuade the owner of a modern mechanical corn picker to go back to the old hand-picking methods.

And try to induce an operator of heavy-duty equipment to return to ordinary tapered roller bearings, once he has used Tyson . . .

Yes, there's been tremendous improvement in bear-

ings. Tyson found the way to add 30% more load-carrying rollers around the raceway. Result: (1) Extra capacity, (2) maximum rigidity, (3) longer life. Most users report double the life of ordinary bearings.

Tyson "All-Rolls" Bearings are interchangeable with other tapered roller bearings. Part numbers and prices are the same. Next time, use Tyson.



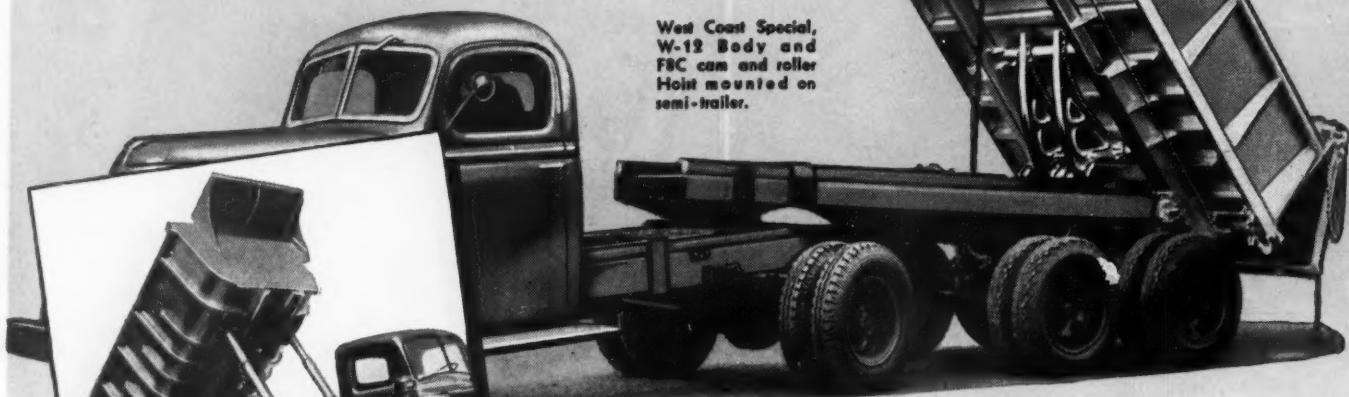
TYSON BEARING CORPORATION • MASSILLON, OHIO

COUNT THE ROLLS • THE ROLLS COUNT

Tyson

THE LAST WORD IN ANTI-FRICTIONEERING



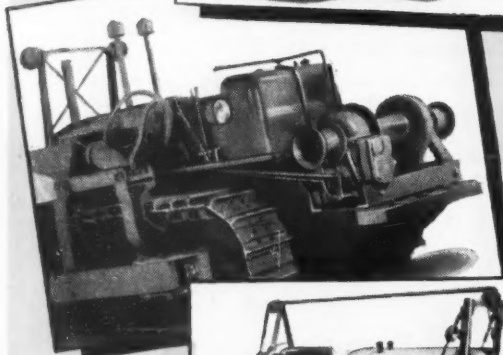


West Coast Special,
W-12 Body and
F&C cam and roller
hoist mounted on
semi-trailer.



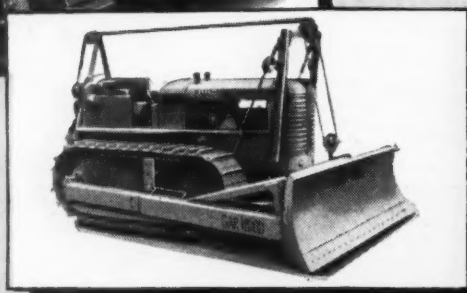
Semi-Rock Body with
special rib reinforce-
ment and open end.
Cap. 13 cu. yds. Dual
hydraulic T-440 Hoists

Gasoline or Fuel
Oil Tank T-2174,
one of a large and
diversified line.



Tractor or utility
winches.

Cable Dozercasters
with angling blade
for Allis-Chalmers
HD-10 and HD-14
tractors.



Designed to give **TOP-NOTCH PERFORMANCE**

**Gar Wood Equipment
Does a BETTER Job for You.**

Some people just work. Others have the ability to rise above the crowd . . . to distinguish themselves by doing better-than-average work. The same comparison can be made in mechanical equipment. Gar Wood Products have a reputation for top-notch service . . . better-than-average performance. That quality didn't just happen. It's the result of years and years of experience in designing equipment to do a specific job in the best possible way. Gar Wood products cover a wide field of uses and in each case you can be sure of one thing . . . they rise above the crowd. Take advantage of Gar Wood top-notch performance when planning your equipment needs.

BUY MORE BONDS . . . AND KEEP 'EM

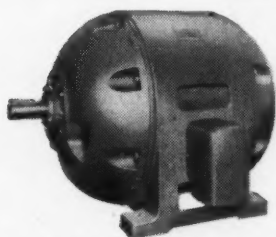
GAR WOOD INDUSTRIES, INC.

DETROIT 11, MICH. WORLD'S LARGEST MANUFACTURER OF TRUCK AND TRAILER EQUIPMENT

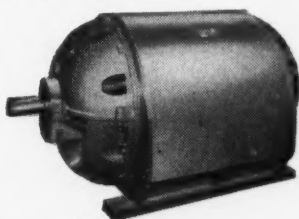
HOISTS AND BODIES • WINCHES AND CRANES • TANKS • ROAD MACHINERY • HEATING EQUIPMENT • MOTOR BOATS

NOW your *big drives* can have it* too!

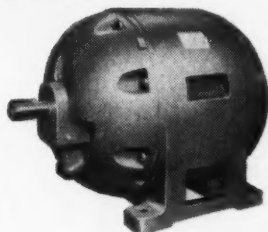
*The EXTRA protection of **TRI/CLAD** construction



Typical, large-size, sleeve-bearing Tri-Clad polyphase motor, now standard up to 2000 horsepower

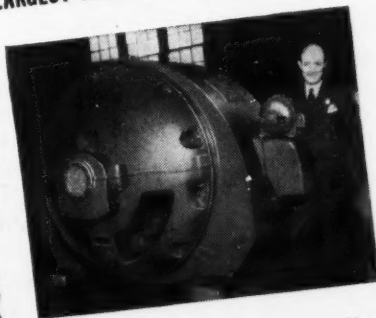


Modified cast-iron frame construction used for certain large sizes of the extended Tri-Clad motor line



Separable housing construction used for large-size ball- or roller-bearing Tri-Clad motors. Roller bearings are standard at coupling end

NEW 2000-hp INDUCTION MOTOR LARGEST MEMBER OF TRI-CLAD FAMILY



Dwarfing the original Tri-Clad motor (resting on the conduit box) in size, this new 2000-hp "big brother" embodies all of the same protective construction features. It operates at 1800 rpm, on 2300 volts, 60 cycles. This new 3-phase motor is in the 6360-frame series, which is five steps larger than the largest standard industry frame size (namely 505).

G-E STANDARD Tri-Clad Induction Motors Now Available to 2000 Hp. For that important *big drive* (up to 2000 hp, 3600 rpm) you can now get a G-E standard Tri-Clad induction motor with all the protective features that have proved so valuable in the more widely used sizes.

● 1. EXTRA PROTECTION FROM PHYSICAL DAMAGE

Cast-iron construction with upper portion completely enclosed to keep out falling objects, dripping liquids. Streamline, cast-iron end shields. Corrosion-resisting finish.

● 2. EXTRA PROTECTION FROM ELECTRICAL BREAKDOWN

Windings of Formex wire are solidly bonded with synthetic resins that are strongly resistant to oil and moisture. Formex wire insulation stands up remarkably under abrasion or "heat-shock."

● 3. EXTRA PROTECTION FROM OPERATING WEAR AND TEAR

Available with either sleeve or ball bearings—in dust-tight housings. Sleeve-bearing design is a further refinement of well-proved Tri-Clad motor bearing proportions, efficiently lubricated, with "air seal" to insure oil-tightness of the housing.

The Tri-Clad, in its wide range of types and sizes, is G.E.'s most widely used (integral-hp) motor. Chances are there's a Tri-Clad to meet your drive requirements "on the nose." Ask for Bulletin GEA-3580. *General Electric Company, Schenectady 5, N. Y.*

Here's Today's Wider Range of Standard Sizes

TYPE K	1 hp to 2000 hp at 1800 rpm
TYPE KG (High starting torque, low starting current)	5 hp to 200 hp at 1800 rpm
TYPE KR (High starting torque, high slip)	Available to 100 hp in speeds required for high-slip, flywheel drive (punch presses, etc.)

Special motors can be custom-built in Tri-Clad design for YOUR problem. Induction motors specially designed to the job can generally be built with many of the Tri-Clad motor's strong points, such as enclosed upper portion, smooth cast-iron end shields, windings of Formex wire, and double-end ventilation.

GENERAL  ELECTRIC

750-264C-1590

Buy all the BONDS you can
—and keep all you buy

Now... THE GREAT



HERE they are—four great new Lorains we've been waiting to tell you about! This brilliant, hard-hitting "41" series of machines combines 50 years of shovel and crane engineering experience with the valuable new things we've learned building for war. They're heavier, new in performance, greater in capacity, easier to service, crammed with profit-making new features. They're the best we've ever announced—and best of all, they're **HERE**—ready and raring to go into your postwar business!

Every one of these four new performers—the Lorain 41 Crawler, the Moto-Crane 414, the Moto-Crane 416, and the Self-Propelled Crane 414—has its own long list of great features. Any one of these machines is good news by itself. But **They** now gives you all of them at once—so you may have the one that's best in mounting, boom equipment, speed and basic efficiency for your job.

Features, Features and More Features!

They engineers spared no effort—left no spot untouched—in drawing the plans for these new beauties. Here are just a few things they did for you!

A brand new, long life, shoe type swing clutch that gives far smoother action and many times the usual service life. Greatly increased capacities (ask for the new ratings.) $\frac{3}{4}$ -yd. chain crowd shovel. Dual boom stop on all crane booms . . . a double safety feature. Two-piece, all-welded, pin-connected, fast-assembly boom interchangeable for all crane, clam and drag work. All available with gas, diesel or electric power.

As soon as you see these new Lorains in action, you'll want to put one to work! Check the features and capacities we have room to give you here—then see your nearest Lorain Distributor for the complete facts!

**GET THE FACTS
AND YOU'LL GET A...**

"41"

SEE YOUR LORAIN DISTRIBUTOR NOW!

LOR.

Entire
30" s
Two
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Steers
New,
Great
Great
Conve

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NEW LORAIN "41" SERIES!

LORAIN 41, 2-SPEED, CHAIN DRIVE CRAWLER

Entire mounting is new, longer, wider, heavier.

30" swamp type treads standard.

Two travel speeds standard — $\frac{3}{4}$ and $1\frac{1}{2}$ MPH — either direction.

Steers from cab in any swing position.

New, positive 4-way ratchet and pawl tread and travel lock.

Greater crane capacities.

Greater clamshell and dragline bucket capacities.

Convertible to shovel, crane, dragline, clamshell, backdigger.

The Three New Rubber-Tired Lorains

MOTO-CRANE 414 (4-WHEEL DRIVE)

Greater crane capacity—now 20 tons.

Carrier specially designed for shovel and crane loads.

Ten forward speeds, 1 to 28 MPH. Two reverse speeds.

Six wheels. Four dual-tire rear wheels powered by two worm driven axles.

Air brakes on four rear wheels.

Convertible to shovel, crane, dragline, clamshell, backdigger.

MOTO-CRANE 416 (6-WHEEL DRIVE)

Here, for the first time commercially—the heavy-duty rubber-tired Moto-Crane that was developed for Military Service and came out with top honors for stamina and performance!

20-ton crane capacity.

Six-wheel drive. All axles double-reduction drive.

Eight speeds forward, 1 to 31 MPH. Two reverse speeds.

Power-assisted steering.

Air brakes on all six wheels.

SELF-PROPELLED CRANE 414

20-ton crane capacity.

Single engine, single operator.

Six wheels with power on four worm driven rear wheels.

Four travel speeds in both directions, 1 to 7 MPH.

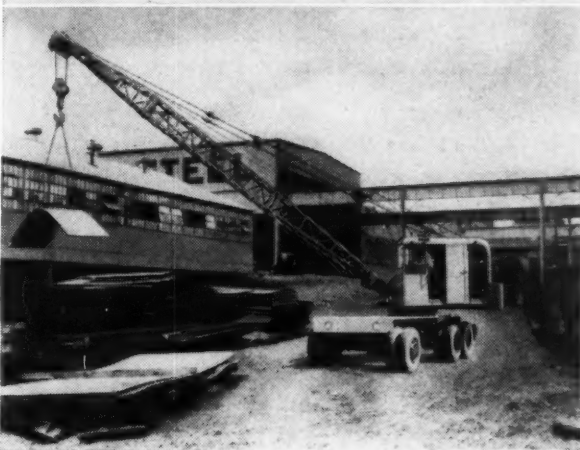
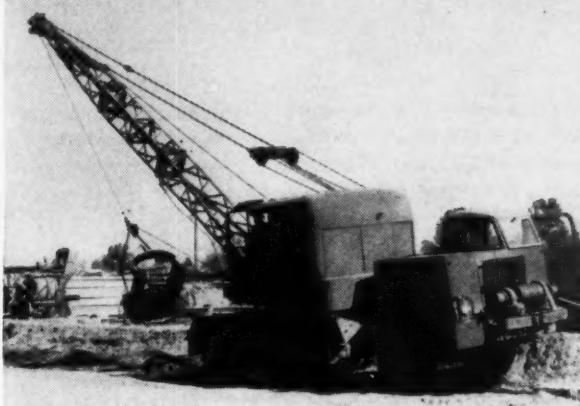
Simultaneous hoist, swing, travel and boom derricking.

Air brakes on four rear wheels.

Air power, finger-tip steering.

Dual-tired front wheels, differential type to eliminate scuffing.

THE THEW SHOVEL COMPANY • Lorain, Ohio



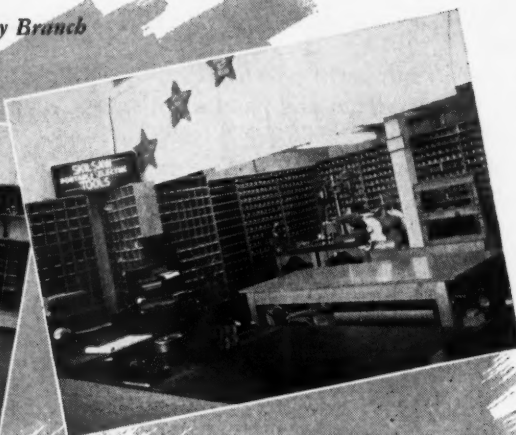
Reg. Trade Mark
thew Lorain

CRANES • SHOVELS • DRAGLINES • MOTO-CRANES

HOW TO PUT YOUR SKILSAW IN NEW TOOL CONDITION RIGHT NOW *...for Better, Faster Sawing on the Job!*



Views of Typical Skilsaw Factory Branch



1 Take your SKILSAW to any of the nearby SKILSAW Factory branches or authorized service stations listed at the right, each of which is prepared to give you complete service promptly.

2 We will disassemble your SKILSAW, examine all parts for wear and supply genuine factory parts wherever needed to put your SKILSAW in new tool operating condition.

3 Our expert, factory trained mechanics will then reassemble your SKILSAW and test it by the same methods used at the factory, assuring you of a 100% dependable SKILSAW!

THIS prompt, nation-wide repair and maintenance service is just one of the many reasons why SKILSAW is the world's most popular portable electric handsaw ... why more SKILSAWS are in use than all other makes combined.

SKILSAW, INC. • 5033-43 Elston Ave., Chicago 30, Ill.
FACTORY BRANCHES IN ALL PRINCIPAL CITIES

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San Francisco, Cal.
Seattle, Wash.
Washington, D. C.
Toronto, Ont., Canada

See classified phone directory for address or consult distributor from whom you bought your SKILSAW.

PORTABLE ELECTRIC SKILTOOLS

MADE BY SKILSAW, INC.

SKILSAWS

SKILSANDERS

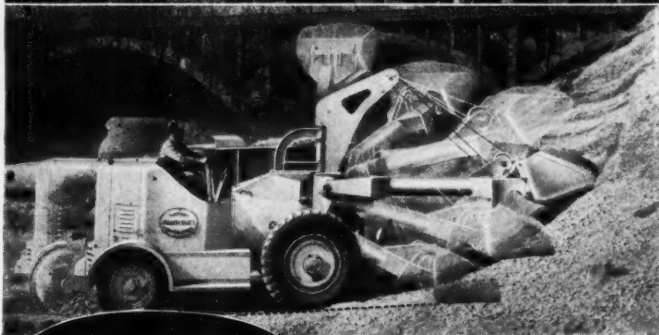
SKILSHEAR

SKILNIBBLER

SKILGRINDERS

SKILDRILLS

because it digs, SWINGS, hoists and dumps in ONE continuous movement



FLEETFOOT
JAEGER LOADER
CRANE and EXCAVATOR

**LOADS TRUCKS
3 TIMES FASTER**

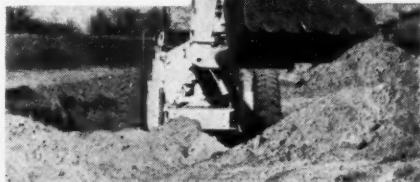
This all-purpose Loader fills a long-felt need for contractors, highway depts., counties, municipalities, quarries . . . With 180° swinging boom and power-closing bucket it loads to either side in one continuous movement — with 11 fewer clutch moves, in 1/3 the usual time . . . NO MANEUVERING — WORKS IN TIGHT PLACES . . . Crowding power is tremendous — with 65 h.p. engine in 3/4 m.p.h. low gear and 80% of load on giant front driving wheels it can dig into any material, backfill, grade, do prime moving and light excavating . . . And with 6 traction speeds and power steering it travels to job at 15 m.p.h.

Send for 52 page Catalog JL-5, showing a hundred year round uses and advantages.

**1/2 to 2 Yd. Buckets — Handle
Any Material from Rock to Snow.**



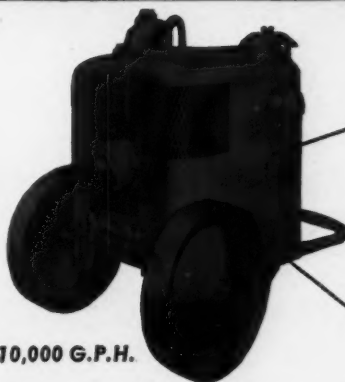
12-25 Ft. Crane Attachment



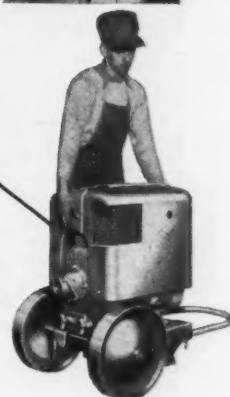
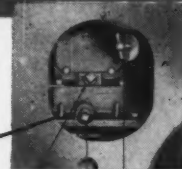
Can Dig Outside Its Wheels

ENCLOSED YET FULLY ACCESSIBLE

JAEGER postwar model "SURE PRIMES" are weather protected for even longer pump life . . .



2" — 10,000 G.P.H.



4" — 40,000 G.P.H.



10" — 240,000 G.P.H.



- "Inherent" priming action plus "jet" priming—faster and doubly sure.
- Replaceable liners in all sizes 2" to 10"
- All seals accessible for inspection.
- More efficient power.
- Micrometer workmanship.
- Certified performance.

NEW CATALOG Shows and Describes All Types and Sizes. Ask for Your Copy Today!

THE JAEGER MACHINE COMPANY

200 Dublin Avenue, Columbus 14, Ohio — Distributors in 120 Cities

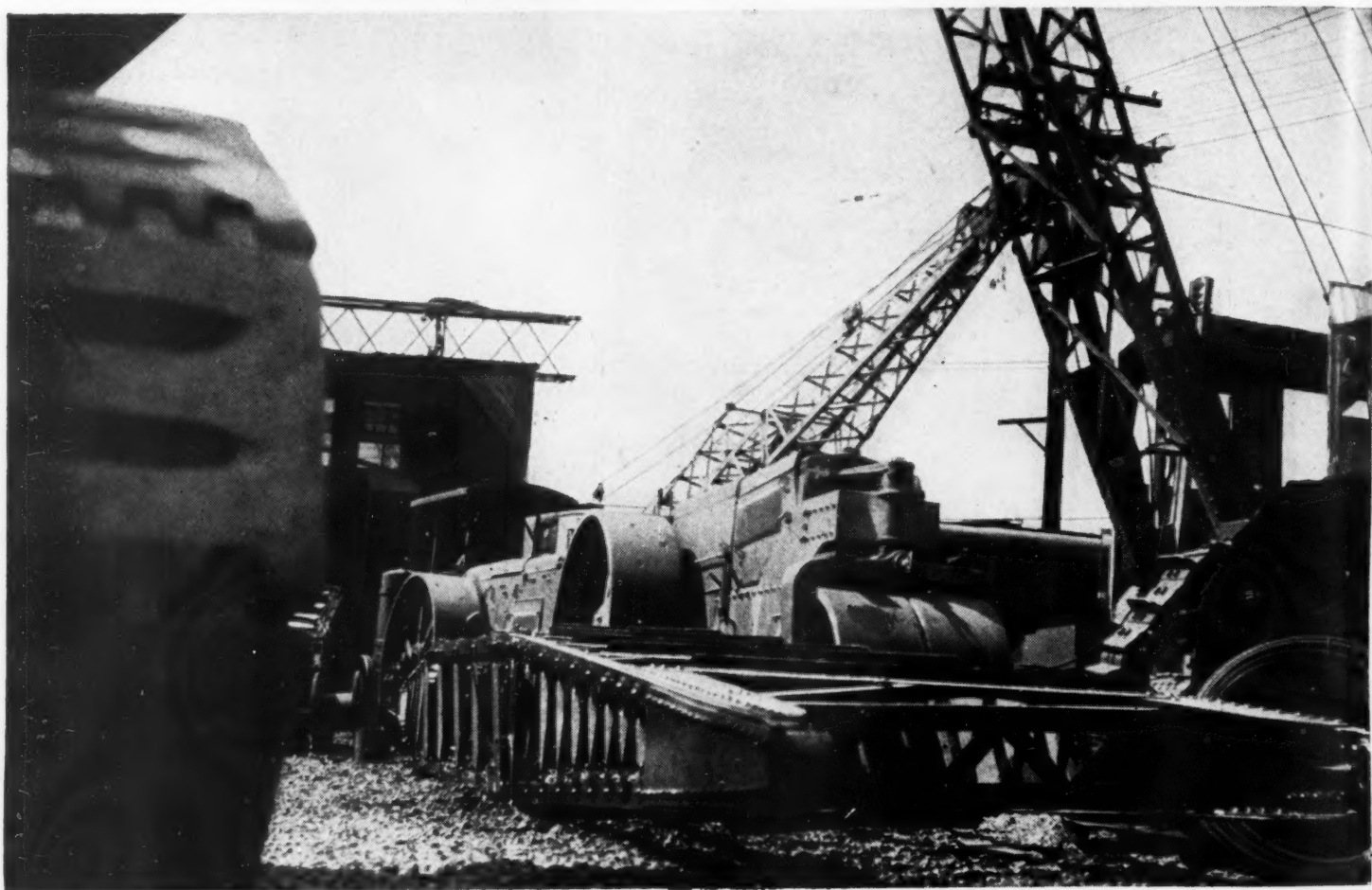
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In Storage...In Use...All



GAS HOLDERS, water-works, sewage disposal plants and all types of equipment used by contractors, can be easily, quickly and economically rustproofed with *Texaco Rustproof Compound*. A single application is usually sufficient for year-round protection.

Texaco Rustproof Compound fights rust three ways:

1. It prevents rust formation on exposed metal.
2. It penetrates existing rust, stops further rusting.

3. It loosens existing rust, makes it easy to remove.

Texaco Rustproof Compound forms a soft, self-sealing, *waterproof* film highly resistant to chemicals and fumes under the severest conditions. It can easily be applied to most surfaces with a paint brush, or thinned down and sprayed to reach inaccessible parts. When necessary it can be removed readily with a kerosine-saturated rag.

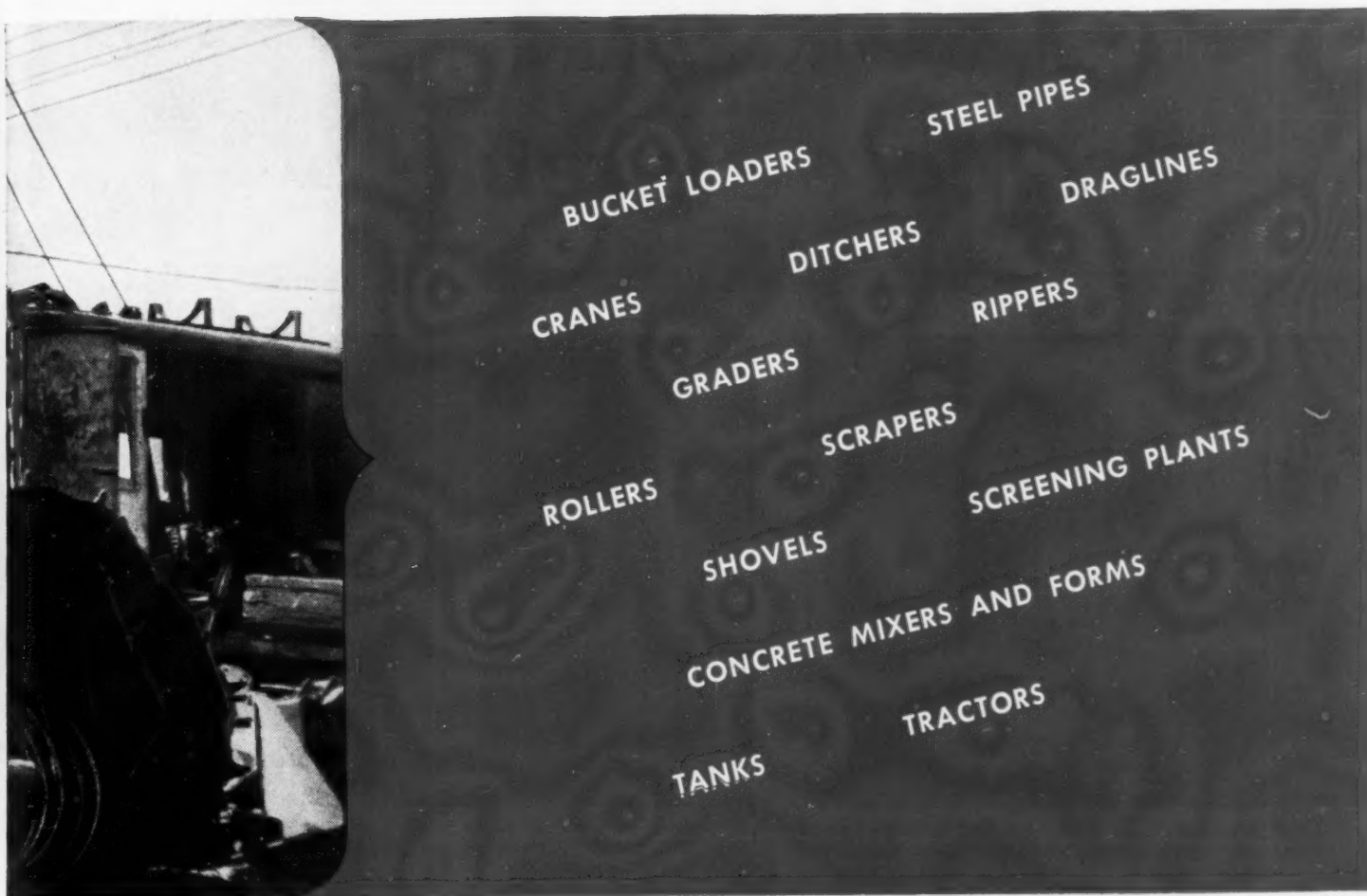
Because of its proved effectiveness and economy, *Texaco Rustproof Compound* is extensively

TUNE IN THE
TEXACO STAR THEATRE
WITH JAMES MELTON
EVERY SUNDAY NIGHT
— CBS



TEXACO

Need Rust Protection



used throughout the construction field . . . as well as by leading railroads, in metal working plants, marine and refrigeration service, automotive, aviation and chemical industries, and, in general, wherever equipment is subject to corrosion.

Order *Texaco Rustproof Compound* today—available through more than 2300 Texaco distributing plants in the 48 States. Call the nearest one, or write:

The Texas Company, 135 East 42nd Street, New York 17, N. Y.

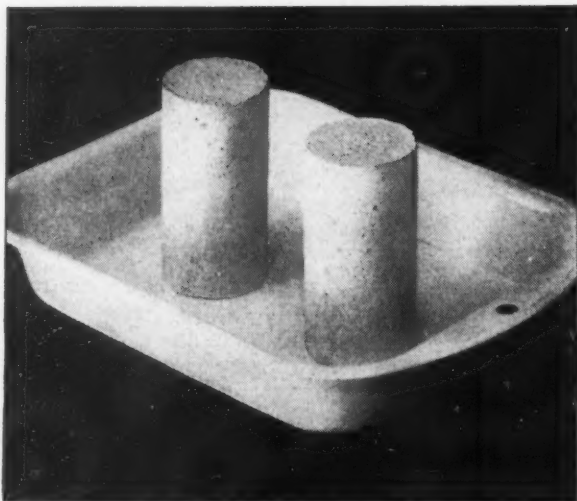


FREE! This 36-page booklet tells why *Texaco Rustproof Compound* prevents rust, where and how to apply it, and how it can add extra years of life to your equipment. A single suggestion in this book may save you thousands of dollars. Write for your copy today.

Rustproof Compound

BRIXMENT MORTAR

Is More Durable



To compare the durability of two mortars, make a cylinder or block of each, let them "cure" for a month or so, then freeze and thaw them forty or



fifty times, with a little water in the pan (the freezing unit of your electric refrigerator will do). Try this with Brixment mortar!

—AND DURABILITY MEANS

PERMANENT STRENGTH AND BEAUTY

For permanent strength and beauty, mortar must be *durable*—must be able to withstand the alternate freezing and thawing to which it is subjected many times each winter.

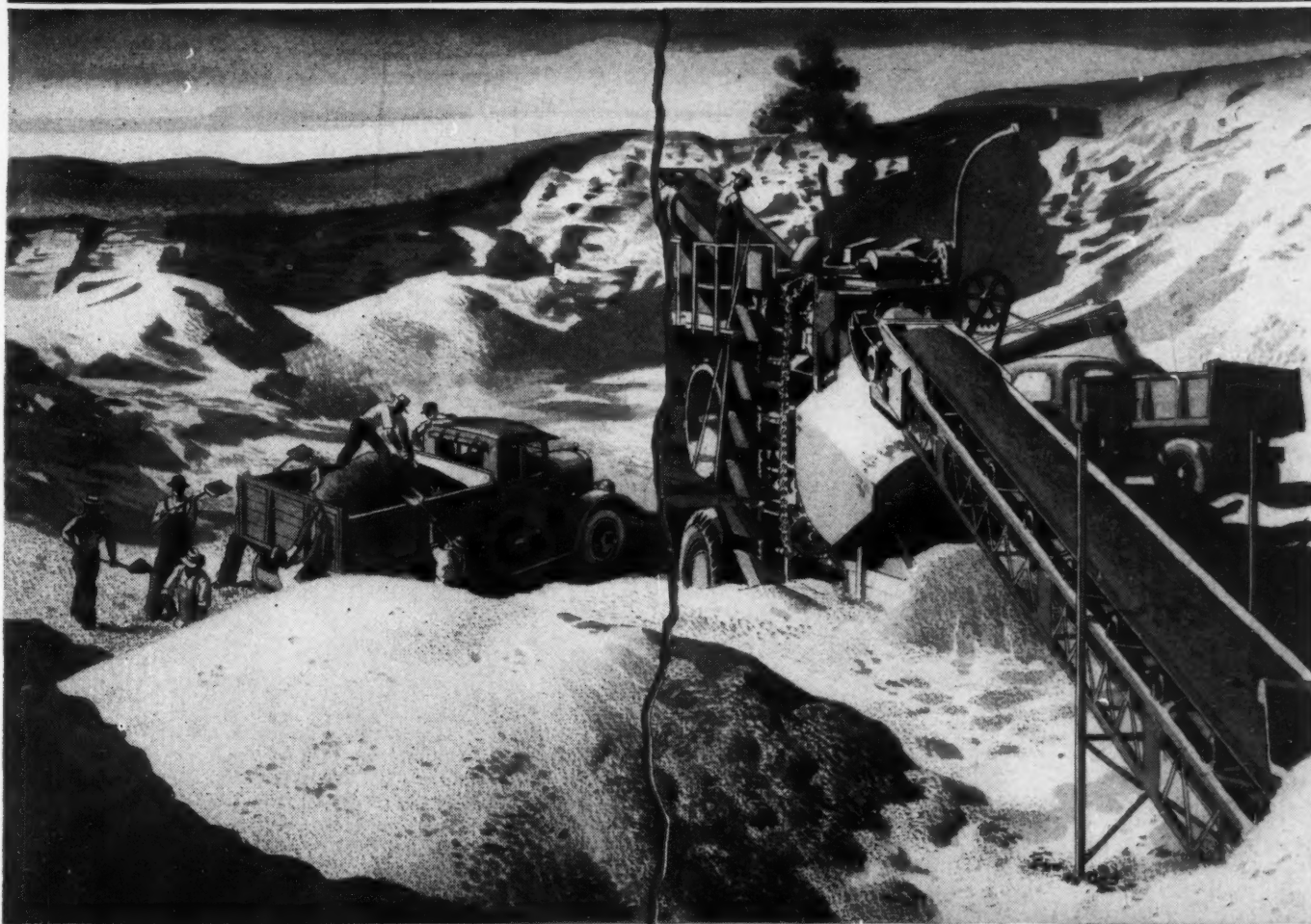
Brixment mortar *is more durable*. This greater durability is due partly to the strength and soundness of Brixment mortar, and partly to the fact that Brixment is waterproofed during man-

ufacture. This waterproofing helps prevent the mortar from becoming saturated—therefore protects it from the destructive action of freezing and thawing.

Walls built with Brixment mortar therefore *retain* their original strength and appearance. . . . Even in parapet walls and chimneys, where exposure is particularly severe, Brixment mortar will almost never require repointing.

LOUISVILLE CEMENT CO., Incorporated, LOUISVILLE 2, KENTUCKY
CEMENT MANUFACTURERS SINCE 1830

Thermoid —Key to Progress in Many American Industries



LOADING OPERATION BEFORE THE
USE OF CONVEYOR BELTING

MODERN LOADING OPERATION USING
THERMOID CONVEYOR BELTING

SINCE 1880, Thermoid has contributed to the progress of American Industry. Through three wars, and the intervening periods of peace, Thermoid engineering, research and manufacturing facilities have been devoted to the improved design and production of Industrial Rubber Products. Thermoid stands today in a position, unsurpassed by any competitor, to contribute to the post-war progress of your industry. The Thermoid Line* of belting and hose for materials handling and power transmission may contain the key to another step forward in the improvement of your process and the reduction of your costs. When you call in the Thermoid representative you'll agree with many other manufacturers that—"It's Good Business to Do Business With Thermoid."

***THE THERMOID LINE INCLUDES:** Transmission Belting • F.H.P. and Multiple V-Belts and Drives • Conveyor Belting • Elevator Belting • Wrapped and Molded Hose • Sheet Packings • Industrial Brake Linings and Friction Products • Molded Hard Rubber and Plastic Products.

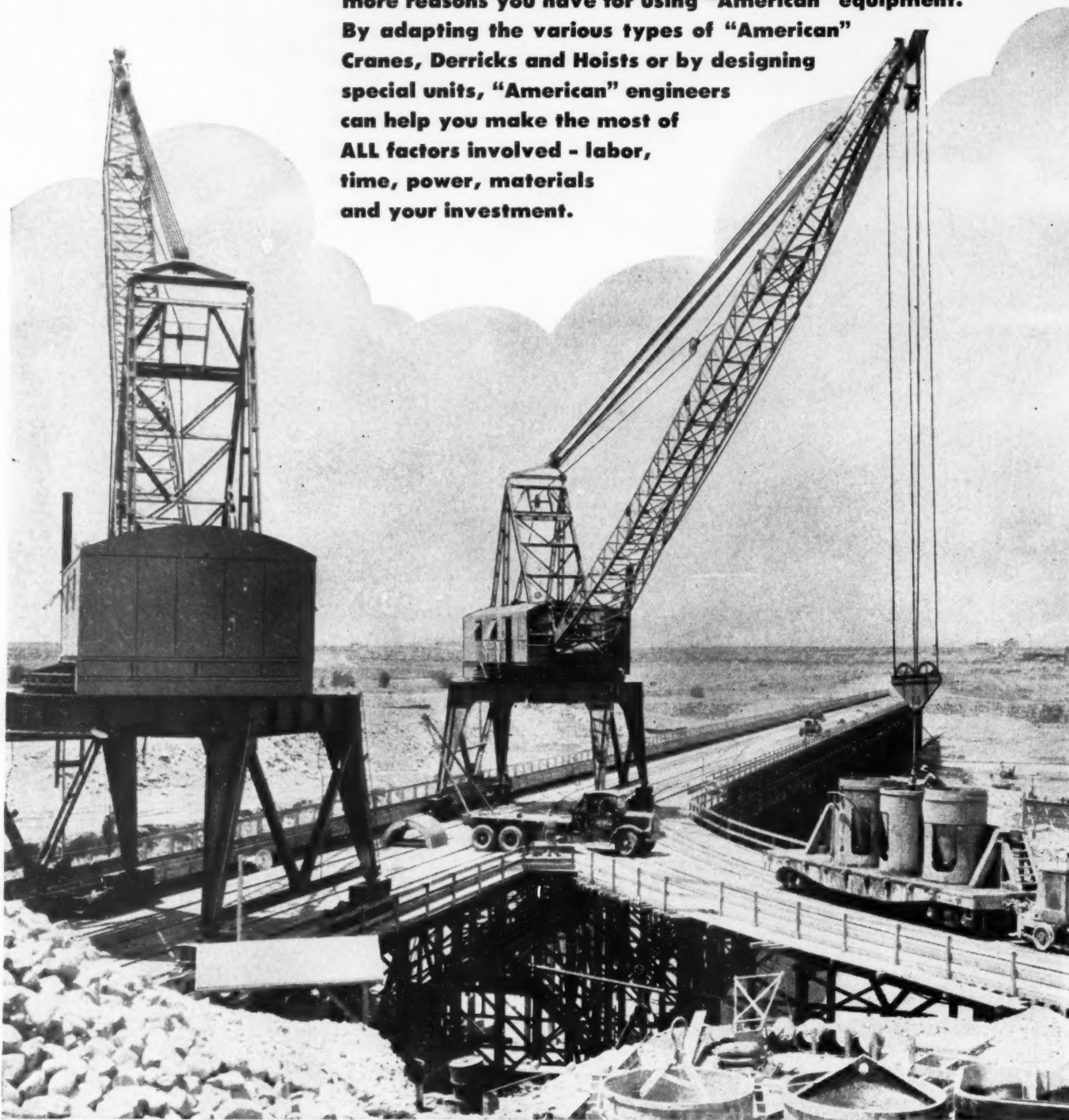
Thermoid Rubber

DIVISION OF THERMOID COMPANY
TRENTON, NEW JERSEY

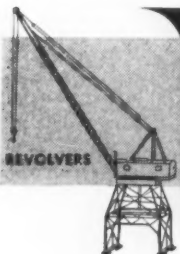
Contributor to Industrial Advancement Since 1880

BOOM out the work . . . with **"AMERICAN" EQUIPMENT!**

The bigger the job, the heavier and higher the lifts . . . the more reasons you have for using "American" equipment. By adapting the various types of "American" Cranes, Derricks and Hoists or by designing special units, "American" engineers can help you make the most of ALL factors involved - labor, time, power, materials and your investment.



Let us help you plan your postwar operations and machinery requirements now.



**AMERICAN
HOIST & DERRICK CO.**

St. Paul 1, Minnesota

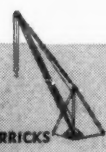
CHICAGO • SAN FRANCISCO • NEW YORK



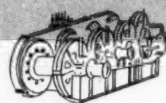
BLOCKS AND SHEAVES

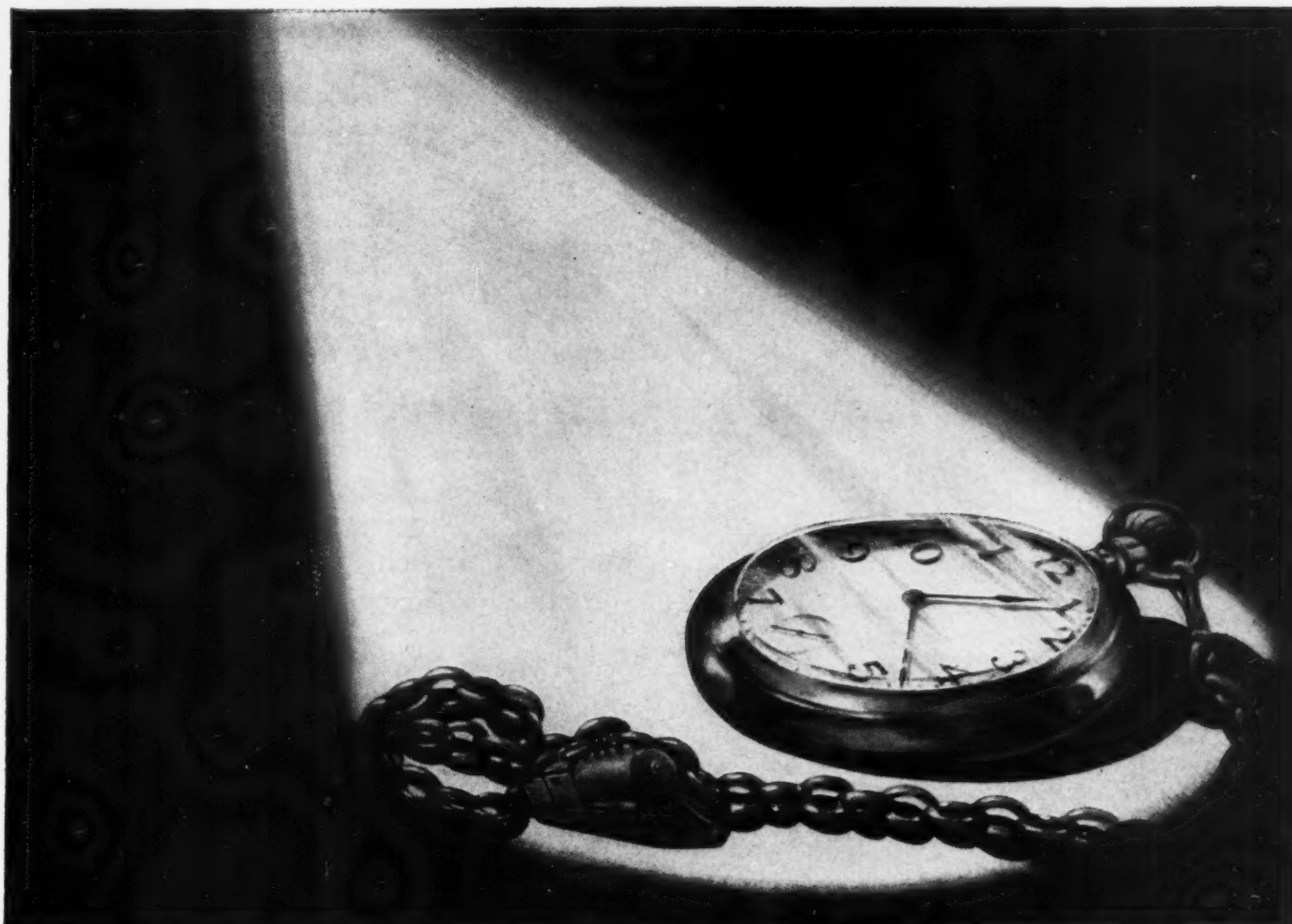


HOISTS



DERRICKS



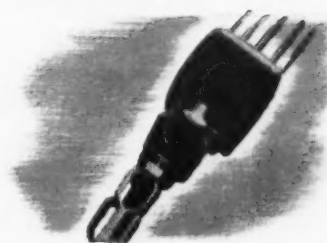


Wire rope *Dependability* means low cost usage!

Unless the wire rope you select has the *reserve dependability* that provides for an *ample* factor of safety, it will become a costly purchase. Selection of the *right* rope means long, low-cost service... true economy!

Dependability, safety and long, low-cost performance of Wickwire Rope starts with the production in our own open hearth furnaces of the correct composition of steel for use in each rope. Here, wire-steel characteristics can be accurately predetermined by the scientific blending of the proper ingredients in the correct percentages to produce the one wire rope best suited for your specific purpose.

At Wickwire *every* step in wire rope manufacture is carefully scrutinized. Special control is exercised through each successive wire drawing operation, and right through to the final laying of every type, size and construction of wire rope. This close watch over quality assures the utmost in wire rope dependability and long service.



Thousands of wire rope users—old hands and new—have found our specially prepared manual, "Know Your Ropes" valuable in making their work easier and prolonging rope life. It contains 78 "right and wrong" pictures, 40 wire rope life savers, 20 diagrams, tables and charts. Send for your FREE COPY today.



WICKWIRE SPENCER

Steel Company

500 FIFTH AVENUE, NEW YORK (18), N. Y.

ASILENE (TEX.) • BOSTON • BUFFALO • CHATTANOOGA • CHICAGO • CLINTON (MASS.) • DETROIT • HOUSTON • LOS ANGELES • PHILADELPHIA • SAN FRANCISCO • TULSA • WORCESTER



Flash—On every competitive test to date, LaPlant-Choate's new 8-yard cable-operated scraper has "run rings around" all other competitive scrapers tested. A limited number are already in the field, with everything set for economical mass production as soon as military conditions permit. You'll agree—it's a scraper well worth waiting for!

THOUSANDS OF SATISFIED OWNERS AGREE

It's LPC for LOWEST POSSIBLE COST



There are many good reasons why thousands of successful operators who have been using LaPlant-Choate rigs for years will keep right on buying them after the war. For one thing, these long-time users know from experience that LPC dozers and scrapers consistently move more yardage faster and at lower cost. They also know that LaPlant-Choate performance and dependability have been job-proved around the world under all types of conditions. And best of all, these veteran operators know that LaPlant-Choate will continue to lead the way in developing new improvements because LPC's entire organization is strictly "tractor-equipment-minded" . . . with more years of specialized "know-how" than any other company in the industry. So it all adds up to LPC—for lowest possible cost and better results—on your jobs, too. See your LPC-"Caterpillar" distributor today. LaPlant-Choate Manufacturing Co., Inc., Cedar Rapids, Iowa; San Leandro, California.

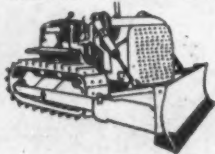


LAPLANT
EARTHMOVING AND LAND



CHOATE
CLEARING EQUIPMENT

THERE IS A JOB-PROVED LAPLANT-CHOATE RIG FOR EVERY EARTHMOVING AND LAND CLEARING NEED



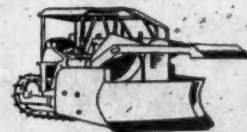
ALL TYPES OF DOZERS—
Straight or angling blade, hydraulic or cable operated, for every size of track-type tractor.



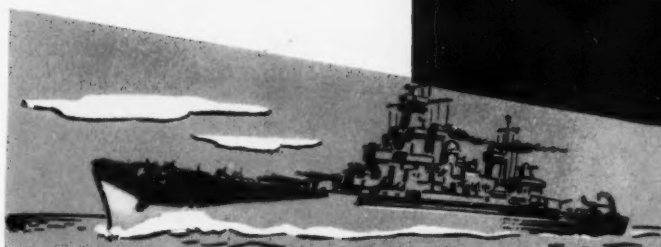
LARGE OR SMALL SCRAPERS—
Hydraulic or cable operated, front or rear dump, for use with your wheel or track-type tractors.



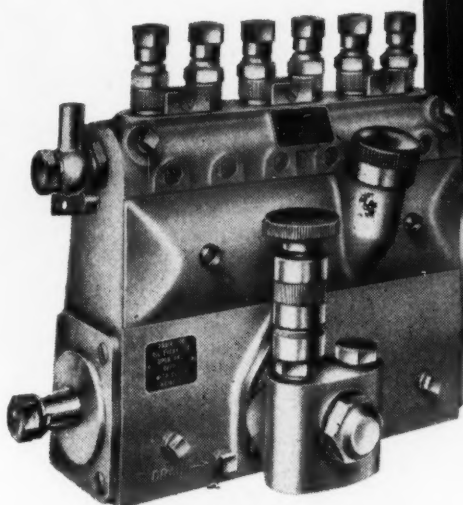
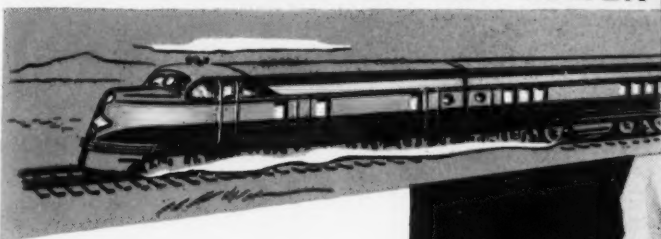
CABLE OPERATED RIPPERS—
For ripping up hard ground, shale or concrete to facilitate loading with LPC "Carrimor" Scrapers.



LAND CLEARING TOOLS—A complete line of Brush Cutters, Treedozer, Rootcutters and Brush Rakes—all are interchangeable.



PRECISION PRODUCTION FOR POWER



performance measured in **M**illionths

In more than 40 Army and Navy applications, American Bosch Diesel Fuel Injection Equipment has served in the tasks of War. Today, Diesel engines turn to the tasks of peace.

In American Bosch Fuel Injection Pumps, tolerances are often measured in millionths of an inch . . . thirty-nine millionths, for instance, between the cylinder wall and the plunger of the pump.

In the picture, an American Bosch craftsman is performing a vital grinding operation on the plunger. This is just one of the several critical operations on this same part . . . critical because the accurate metering of fuel is involved.

Such craftsmanship is traditional at American Bosch. Teamed with engineering experience which guides it, it continues to draw most of the nation's Diesel engine builders to Springfield for their fuel injection requirements.

AMERICAN BOSCH CORPORATION
Springfield 7, Massachusetts

AMERICAN BOSCH

AUTOMOTIVE AND AVIATION ELECTRICAL PRODUCTS



FUEL INJECTION EQUIPMENT

BRONX-WHITESTONE BRIDGE
NEW YORK CITY

SAVED — 1 MONTH IN COLD WEATHER
*1½-ton trucks carried loads over
the concrete 5 days after placing!*



ATLAS HIGH-EARLY CEMENT

Product of Universal Atlas Cement Company

(UNITED STATES STEEL CORPORATION SUBSIDIARY)

OFFICES: New York • Chicago • Albany • Boston • Philadelphia • Pittsburgh • Minneapolis
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CM-H-70



Material, loaded on wagons by an International TD-14, is rushed to construction sites by a fleet of International ID-9 Diesel Wheel Tractors.

Get **INTERNATIONAL** Power... *for Peak Performance!*

• International TracTracTors for those tough, grubby jobs that require the power and sure-footed traction of a crawler. International Wheel Tractors for fast, heavy hauls. That's the right combination to reduce man-hours, speed up the work cycle and cut costs in material handling and construction.

Peak performance from Internationals is assured by their advanced design. For example: more of the engine horsepower is delivered to drawbar and power shaft because all working parts are positively and permanently aligned, and ball bearings are used generously in transmissions and drive shaft assemblies.

International's easy starting, *full* Diesel or carburetor-type engines power these tractors. They are designed and built for continuous, heavy-duty service—and operate smoothly, with plenty of reserve power to pull out of the tight spots.

On the basis of performance, Internationals have hung up a record of leadership in the industrial field. Any International Industrial Power Distributor can substantiate this with performance charts and other data which will help you choose the power and equipment for the jobs you're bidding on.

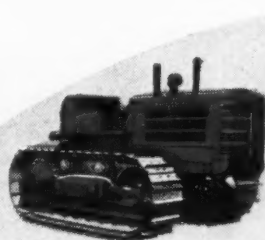
Dependable after-sale service is provided all owners of Internationals by distributor and dealer organizations that span the continent and circle the globe. Factory replacement parts and equipment built for use with International Tractors and Power Units are available through these organizations. This assures maximum value and long term benefits for owners and operators everywhere.

Industrial Power Division

INTERNATIONAL HARVESTER COMPANY

180 North Michigan Avenue

Chicago 1, Illinois



TRACTRACTORS



POWER UNITS



WHEEL TRACTORS

INTERNATIONAL



Industrial Power

**BIG ENOUGH
TO OPERATE
TWO FM-2
WAGON
DRILLS**

**K-500
MOBIL-AIR**



But **YOU CAN AFFORD TO
USE IT FOR ONE FM-2 OR A
LIGHTER LOAD OF AIR TOOLS**

Contractors all over the world know that a K-500 Mobil-Air Compressor operating two FM-2 Wagon Drills makes an outstanding drilling combination . . . powerful, economical, and easily maneuvered.

Although you buy a K-500 to operate two Wagon Drills, you can afford to use it with a single FM-2, or a lighter load of other Air Tools. Its *Drill-More Multi-Speed Regulator*, which automatically adjusts the compressor speed to the use of air, makes the unit even more efficient at half capacity than at full load. Under these conditions it takes no more fuel than if the next-smaller size compressor were used.

Wear is also reduced by the lower average compressing speed at part loads. And you can take a K-500 trail-blazing over mountains and deserts . . . *it's the lightest 500-cfm portable available.*

Let an I-R representative tell you more about the Drill-More Regulator and other features available only in Ingersoll-Rand's 500-cfm compressor.

Ingersoll-Rand
11 BROADWAY, NEW YORK 4, N. Y. 2-729

New Alemite Lubrication Equipment to Keep Old Machines Rarin' to Go!

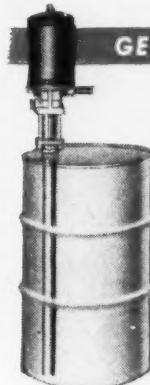
The stage is set for a revival of civilian construction—and all signs point to a boom! But, until you can get all the new machines you want, many old ones will have to do. That's why it's tremendously important to keep them in shape with proper, positive lubrication. And genuine Alemite Lubrication equipment will help you do a safe, dependable job.



GENUINE ALEMITE

Loader Pump

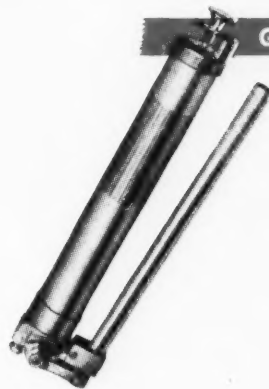
Model 6425 . . . portable, 35-lb. capacity pump for loading grease guns with light-bodied and semi-fluid lubricants. A very practical unit where machines being serviced are some distance from maintenance departments. Economical because it delivers lubricant only when gun is placed on loader valve. Complete with adapters and bracket for carrying gun.



GENUINE ALEMITE

Barrel Pump

Model 7710 . . . air operated. A rugged, heavy-duty pump. Used for large volume delivery of oils or fluid gear lubricants. Ideal for filling large crank cases, housings and large bearings requiring oil. This pump fits directly into the bung hole of a 55-gallon drum.



GENUINE ALEMITE

Grease Gun

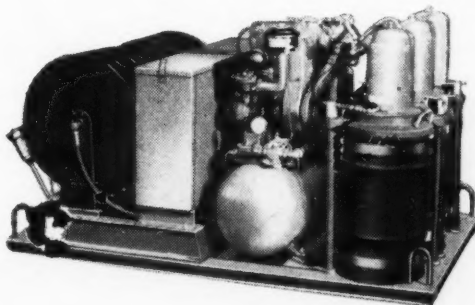
Model 6679 . . . here is a heavy-duty gun that can take abuse and still do a dependable lubrication job. Has 21-ounce capacity and handles fibrous, heavy and light-bodied greases. Develops up to 5000 pounds pressure. Easily and quickly filled through a loader valve or by removing the cylinder head. It is spring primed. Extra long handle gives maximum operating ease. Used with hose or adaptors.



GENUINE ALEMITE

Portable Electric-Power Gun

Model 7191 . . . a high pressure unit complete with 25-lb. container. Standard model—110 volt A.C. Others available on request. Handles all types of light-bodied lubricants and delivers approximately 9-oz. per minute. Automatic switch shuts off motor at 5000-lbs. pressure. Rolls on two large rear wheels and one front Bassick caster. Comes completely equipped, ready to use.



Genuine Alemite Portable Service Station

Model 2417 . . . a version of the famous Alemite Portable Service Stations used on hundreds of high-priority wartime construction projects. This unit brings power lubrication out to machines on the job . . . services pressure gun fittings, gear housings, final drives, rear axles, transmissions and crank cases.

ALEMITE

First in Modern Lubrication



For complete details, consult your Alemite distributor—or write direct to Alemite, 1840 Diversey Parkway, Chicago 14, Ill.

CONSULTATION • ENGINEERING • EQUIPMENT • LUBRICANTS • MAINTENANCE



ONE WELDED UNIT

Machinery stays aligned on the new Koehring 1½ yard shovel. Precise alignment prolongs life of the machine, prevents undue wear, cuts upkeep cost.

SIDESTANDS ARE INTEGRAL

Sidestands supporting the horizontal shafting on the new Koehring 605 are integral parts of the massive turntable, securely welded on, permanently joined to keep shafting in lasting alignment.

GEAR HOUSING WELDED IN

Because a separate, bolted-on housing might work loose to throw vertical shafting out of line, the bevel swing and traction gear case on the new Koehring 605 is welded directly into the turntable. No bolts used to join housing and turntable.



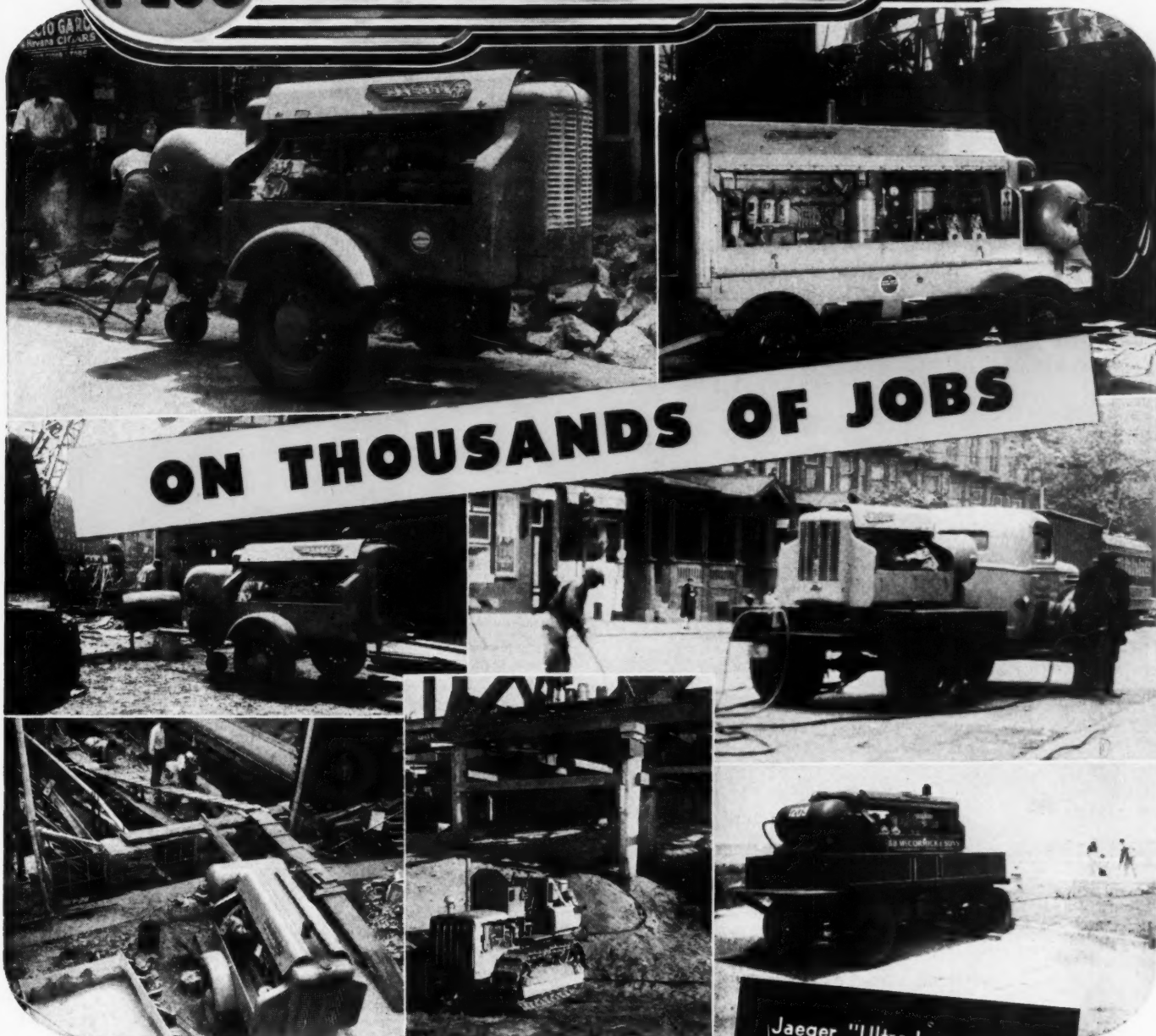
Ask For Your 605 Catalog Today

KOEHRING COMPANY
MILWAUKEE 10
WISCONSIN



HEAVY-DUTY CONSTRUCTION EQUIPMENT

AIR PLUS JAEGER COMPRESSOR



ON THOUSANDS OF JOBS

... from coast to coast, Jaeger trailer, truck and tractor-mounted "AIR PLUS" Compressors are delivering more air, cooler air, drier air ... with smooth-running, precision-built units that set new standards for economy of fuel and upkeep. Sold and served by Jaeger distributors in over 100 cities. Ask for Catalog JC-5

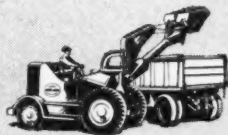
THE JAEGER MACHINE CO., Columbus 16, Ohio.

REGIONAL OFFICES: 8 E. 48th St. NEW YORK 17, N. Y. 226 N. LaSalle St. CHICAGO 1, ILL. 235-38 Martin Bldg. BIRMINGHAM 1, ALA.

Jaeger "Ultra-Lapped" Precision Valves can hold air above 90 lbs. pressure for 20 to 25 minutes (5 to 10 times longer than others — THAT'S PROOF YOUR TOOLS ARE GETTING ALL THE AIR!

JAEGER

Engineered EQUIPMENT



"FLEET-FOOT"
Loaders



"SPEEDLINE"
Concrete Mixers



"SURE PRIME"
Contractors Pumps

JAEGER-LAKEWOOD SPREADERS, FINISHERS AND BITUMINOUS PAVERS, FORMS, FORM TAMPERS—"DUAL-MIX" TRUCK MIXERS, AGITATORS—JAEGER HOISTING ENGINES, TOWERS

BACK TO

"Civies!"



And, as far as G.I. Joe is concerned . . .
but fast!

And it's back to "civies" for all industry,
too, as the nation gets ready for the peace-
time change.

We at Levinson Steel, proud of our repu-
tation for dependability and service, have
already "changed clothes." We've rolled
up our sleeves and are ready to go to
work. We're prepared *now* to handle your
inquiries for warehouse and fabricated steel.

'Phone, wire, write!

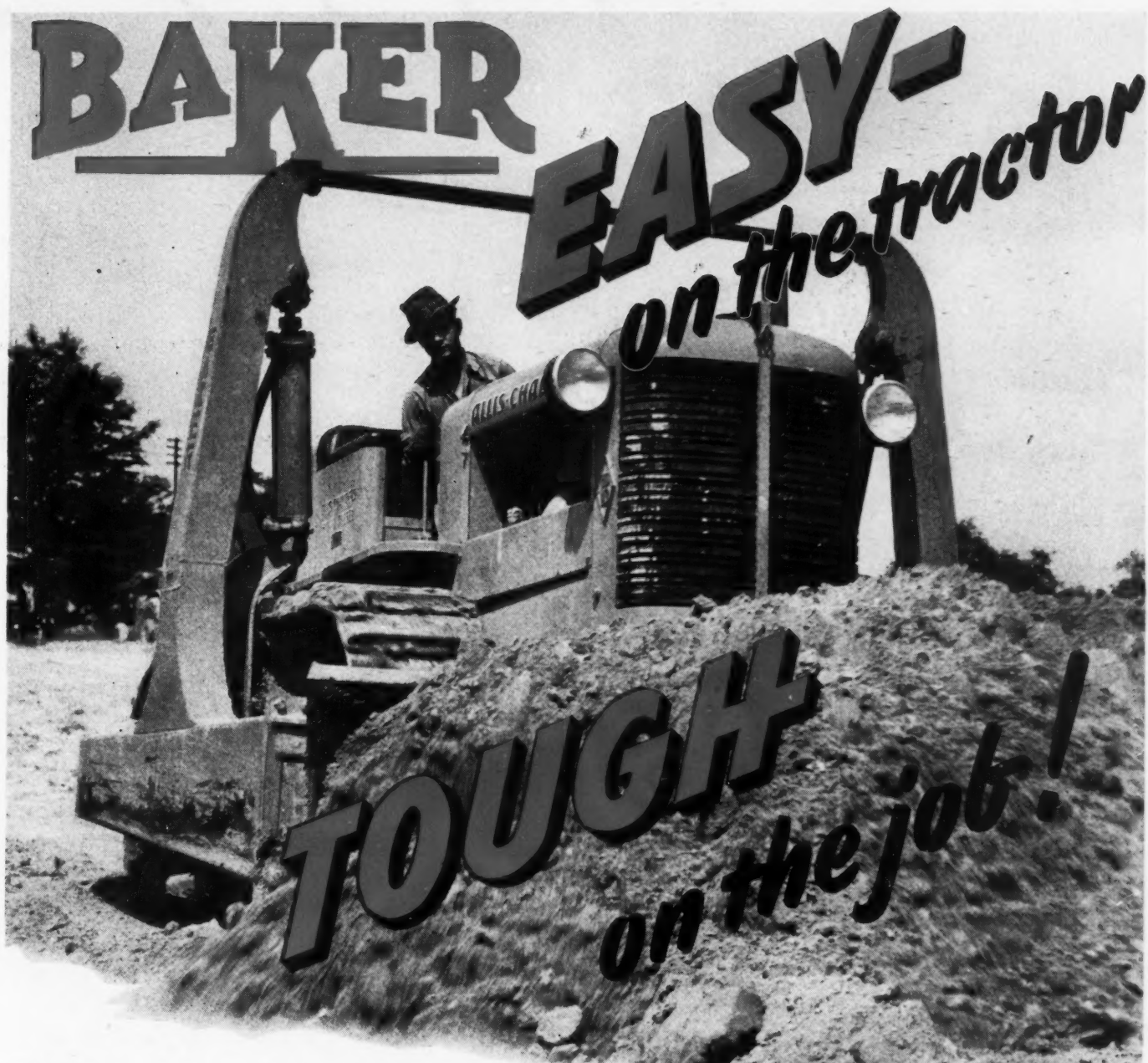


THE LEVINSON STEEL CO.

Wharousers—Fabricators

PITTSBURGH, PA.

LS-3-A

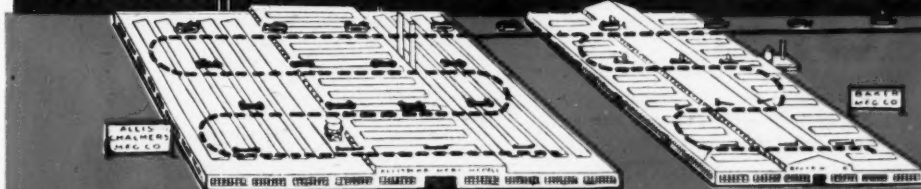


Baker design, balance and construction pays off in performance on the job — in continuous hour after hour operation — in extra yardage moved — in less wear and tear on the tractor. Baker hydraulic and cable 'dozers were designed specifically for Allis-Chalmers tractors — for their weight, power and speed. That's why they're easy on the tracks, rollers, idlers, sprockets, and final drives — that's why they turn maximum tractor power into push on the blade — that's why you can expect more from a BAKER, AND GET IT!



SPRINGFIELD, ILL.

"STRAIGHT THROUGH" ASSEMBLY LINE - ALLIS-CHALMERS TO BAKER TO YOU!



The modern Baker plant with its completely equipped fabricating, machining and blacksmithing shops adjoins the Allis-Chalmers crawler tractor plant. When you order an A-C tractor with Baker bulldozer or gradebuilder, your tractor leaves the A-C assembly line, crosses a narrow court and goes on the Baker final assembly line.



CONSTRUCTION AHEAD

Yes—highway construction ahead. Plenty of it. And a lot of it, planned by far-seeing highway engineers, is going to make good use of Bethlehem's complete line of steel highway products.

By buying from Bethlehem, you get service that's co-ordinated to save confusion, delay and extra paperwork. Your order is handled as a unit, with shipments scheduled to reach the job as needed. No delays! No idle men—no idle equipment!

Bethlehem makes all the steel products needed in building a modern concrete highway or highway bridge. The nearest Bethlehem district office will gladly give you full information, and explain in detail how Bethlehem's complete highway service can save you time and money. Write or phone today!

Bethlehem Steel Company, General Offices: Bethlehem, Pa.

REINFORCING STEEL

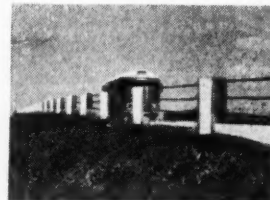
Bethlehem Reinforcing Bars, plain and deformed, are made in all standard sizes and grades, of new-billet steel. Most Bethlehem warehouses can bend bars to shape and cut them to specified lengths.

Bethlehem Welded Wire Fabric is made from tough, cold-drawn wire, is readily installed and gives reliable service. Made in types to meet all standard specifications.



GUARDS AND POSTS

Standard Bethlehem $\frac{3}{4}$ -in., 3-strand highway guard is made of tough, durable, double-galvanized Bethlehem steel cable, good for years of service. Bethlehem's beam-type guard rail, called the Safety-Beam, is made in standard lengths of 12 ft., 6 in.—or can be supplied in lengths up to 50 ft. The Bethlehem standard guard rail post is approved in many States where guard rail is an important part of the highway program.



BETHLEHEM PRODUCTS FOR HIGHWAYS Road Joints Center Strip Dowels Dowel Bar Supports Reinforcing Bars Bar Mats Bar Ties Reinforcing for Concrete Pipe Bridge Floor Reinforcing Concrete Slab Spacers Welded Wire Fabric Guard Rails Guard Posts and Brackets Wire Rope and Strand Right-of-Way Fence and Posts Anchor Rods Pipe Hollow Drill Steel Digging Bars Structural Steel Mold Boards Corrugated Sheets Turnbuckles Tie Rods, Spikes, Bolts and Nuts Timber Bridge Hardware Sheet and H-Bearing Piling

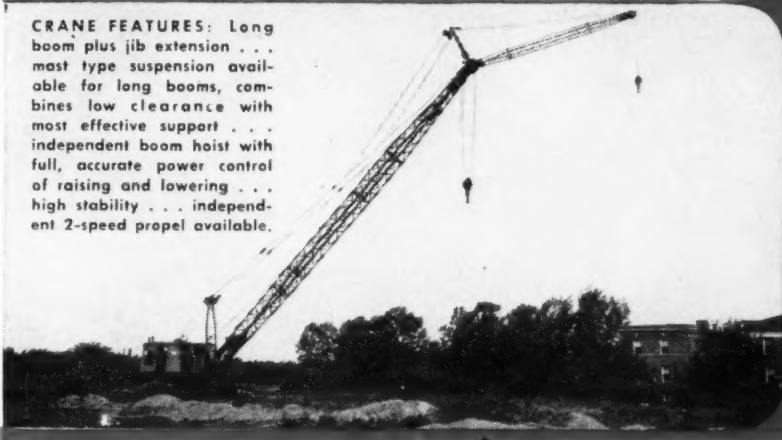




▲ SHOVEL FEATURES: Strong, light boom with big point sheaves for effective application of digging force . . . independent, positive, twin rope crowd . . . high lip, curved door dipper for fast filling and dumping in rock and dirt.



DRAGLINE FEATURES: Big working ranges . . . full rotating fairlead . . . big treads for ample bearing area (convertible from flat to tapered ends in field) . . . fully responsive control . . . oversize brakes.



CRANE FEATURES: Long boom plus jib extension . . . mast type suspension available for long booms, combines low clearance with most effective support . . . independent boom hoist with full, accurate power control of raising and lowering . . . high stability . . . independent 2-speed propel available.

Remarkable balance of speed and power in crowd (or drag), hoist and swing gives the 38-B the smooth, fast operating cycle that spells big output on every job. Selection of the most modern materials, efficient weight placement and widespread use of selective hardening result in a machine with ample strength for continued tough digging, but without a pound of excess weight to slow it down. Anti-friction bearings and oil-enclosed gears add to smooth operation and long life. Big, simple machinery units are easily accessible, require minimum maintenance for top performance. Equally effective as shovel, dragline, clamshell, or crane, the 38-B is a real postwar excavator, thoroughly field tested.

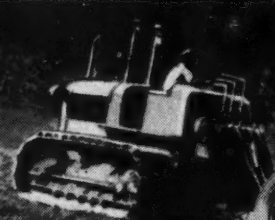
It's new . . . it's fast . . . it's long-lived! It's just what you need in a 1 1/2-yd. machine to put you in good position in the competitive peacetime years. Find out the full story on the 38-B from your Bucyrus-Erie Distributor.

36E49C

BUCYRUS-ERIE
SOUTH MILWAUKEE, WISCONSIN



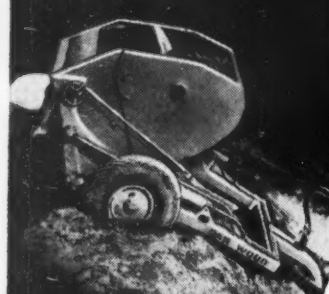
Sheep Foot Tamping Roller



4-Wheel Hydraulic Scraper



2-Wheel Hydraulic Scraper



Cable Dozercaster



4-Wheel Cable Scraper

GAR WOOD ROAD MACHINERY WITH ALLIS-CHALMERS DIESEL POWER

for efficient earth moving

The present demand for Gar Wood Road Machinery is the greatest in Gar Wood history. The very large proportion of repeat orders from users points to the reason: Gar Wood equipment delivers top efficiency on the job. Place your order now with your Allis-Chalmers dealer.



SPECIFY GAR WOOD

FOR OUTSTANDING PERFORMANCE



Hydraulic Dozercaster



Hydraulic Bulldozer



Heavy Duty Ripper



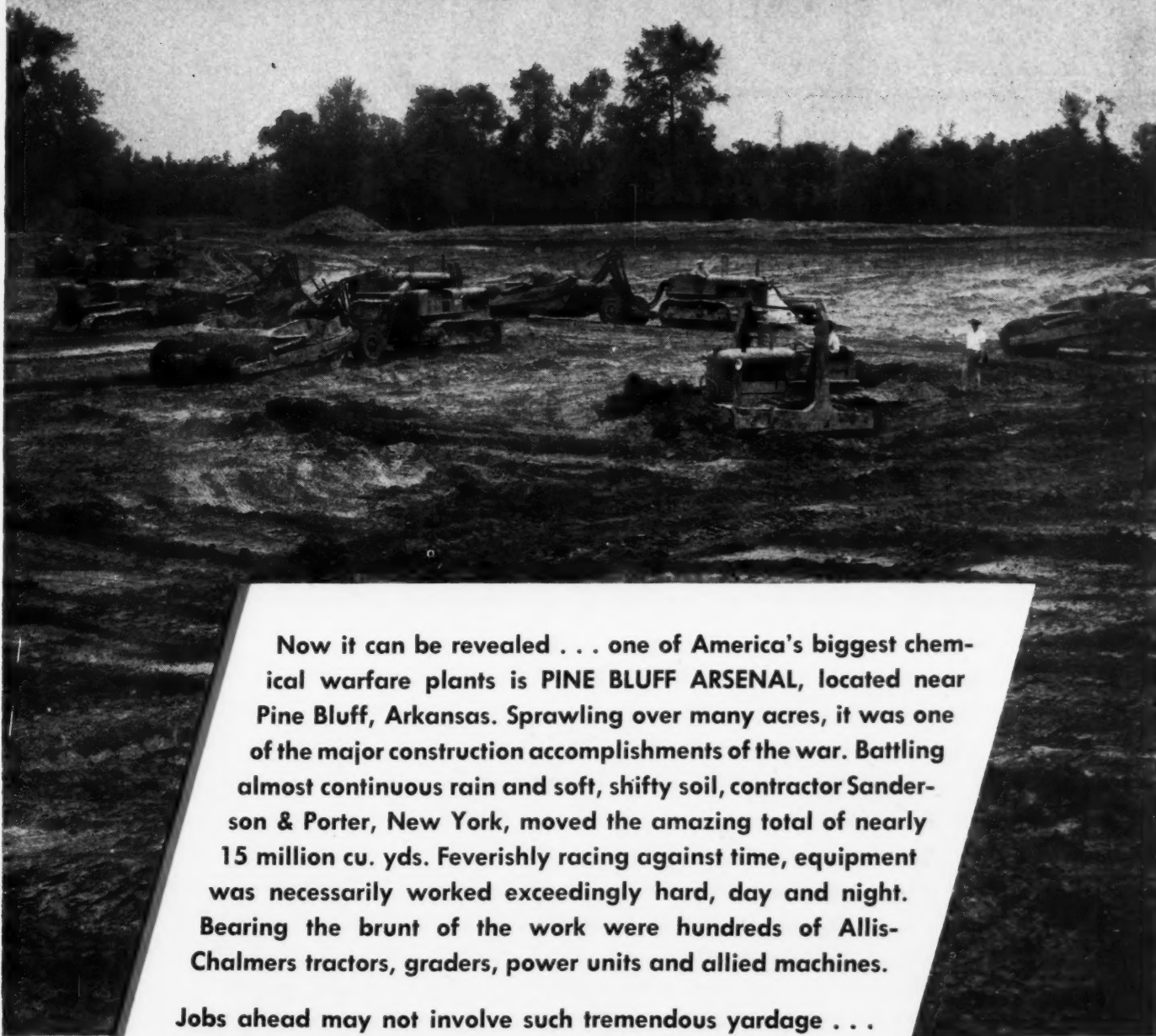
GW ROAD MACHINERY
is Sold Through
ALLIS-CHALMERS
Dealers Everywhere

ROAD MACHINERY DIVISION

GAR WOOD INDUSTRIES, Inc.
DETROIT 17, MICHIGAN

OTHER PRODUCTS OF GAR WOOD INDUSTRIES INCLUDE HOISTS AND BODIES • WINCHES AND CRANES • TANKS • HEATING EQUIPMENT • MOTOR BOATS

15 Million Yd. Job!



Now it can be revealed . . . one of America's biggest chemical warfare plants is PINE BLUFF ARSENAL, located near Pine Bluff, Arkansas. Sprawling over many acres, it was one of the major construction accomplishments of the war. Battling almost continuous rain and soft, shifty soil, contractor Sander-son & Porter, New York, moved the amazing total of nearly 15 million cu. yds. Feverishly racing against time, equipment was necessarily worked exceedingly hard, day and night. Bearing the brunt of the work were hundreds of Allis-Chalmers tractors, graders, power units and allied machines.

Jobs ahead may not involve such tremendous yardage . . . but big or small . . . you can depend on fast, powerful Allis-Chalmers Diesels to rush them to completion in less time, at greater profit to you. Improved by their experience on many tough war projects and campaigns, the new A-C tractors are ready to establish new records on peacetime operations. For early delivery . . . order NOW!

Part of the big fleet of A-C Diesels on the Pine Bluff Arsenal project. Nearly a hundred miles of roads and forty-five miles of railroads were built on the site of this plant.

ALLIS-CHALMERS
TRACTOR DIVISION • MILWAUKEE 1, U. S. A.

UNDER-RUN

Socony-Vacuum's Complete Lubrication Service

helps speed field operations . . . simplify
job training . . . cut maintenance hours
and costs . . . helps you meet contract dates
with time to spare!

A large, dark, rectangular sign with a white border, tilted slightly to the right. The sign features the text "SOCONY-VACUUM" in large, bold, white capital letters at the top. Below this, on the left, is a white shield-shaped logo containing a black silhouette of a winged horse (Pegasus) in a running pose. Below the horse, the words "SOCONY-VACUUM" are written in smaller, black, capital letters. To the right of the shield, the words "Contractor's Lubrication" are written in a white, cursive script. At the bottom right of the sign, the word "SERVICE" is written in large, bold, white capital letters.

SOCONY-VACUUM
Contractor's Lubrication
SERVICE

SOCONY-VACUUM OIL COMPANY, INC., and Affiliates:
Magnolia Petroleum Co., General Petroleum Corp. of Calif.

DEADLINES!

● Socony-Vacuum lubrication service *saves more time, more ways, in more departments* because it's flexible, all-inclusive!

Our complete line of quality lubricants means exactly the right oil or grease for every application . . . eliminates the need for special orders . . . means less chance of a single machine slowing down or stopping the work of your entire plant . . . more productive hours for your equipment.

Moreover, your Socony-Vacuum Representative is an expert in planning regular on-the-job deliveries to speed field operations, minimize inventory problems! He'll also supply tested

maintenance schedules . . . help your men adapt them to your specific needs . . . instruct "green" help on where, when and how to lubricate all your machines. If you require engineering aid, this is another service he can bring you.

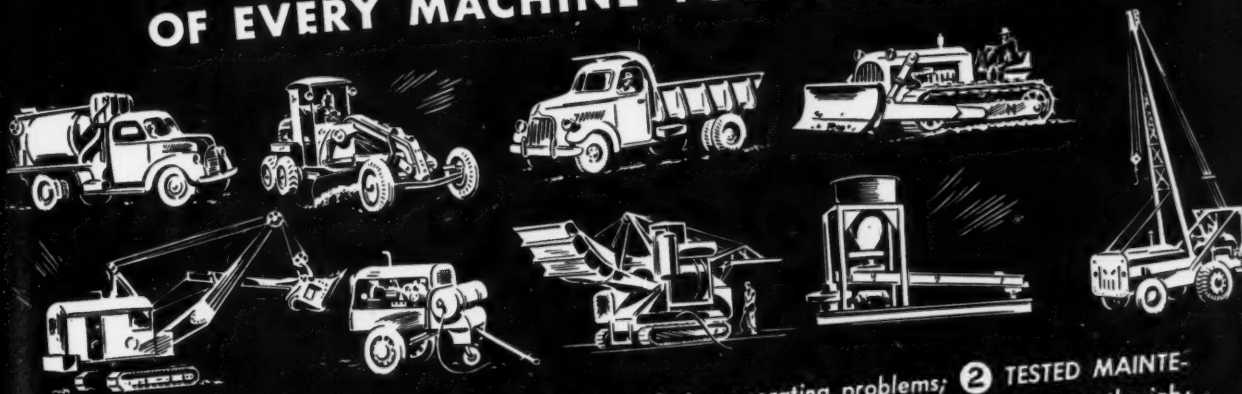


Why be satisfied with fuels and lubricants alone? Save time with Socony-Vacuum's *complete Lubrication Service!*

**"ON YOUR STAFF—BUT
NOT ON YOUR PAYROLL"—**

Your Socony-Vacuum Representative

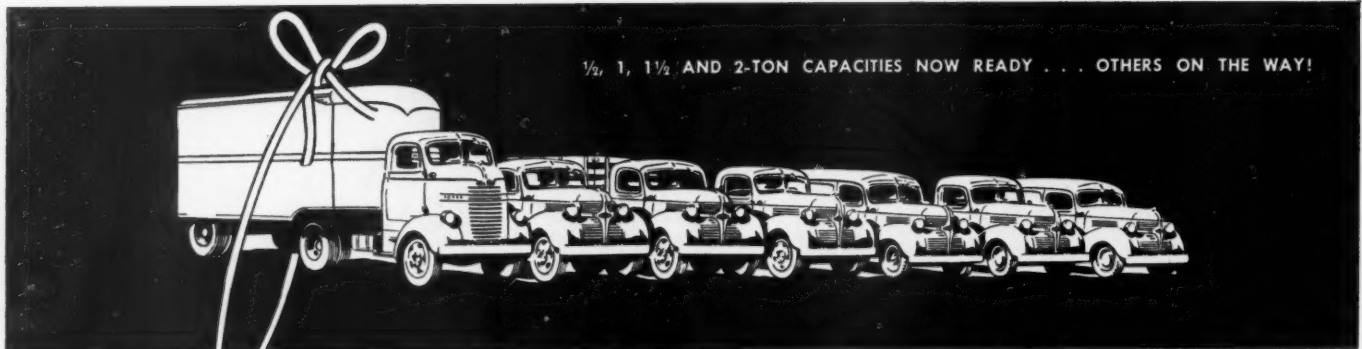
**CORRECT LUBRICATION FOR EVERY PART
OF EVERY MACHINE YOU OPERATE . . .**



PLUS

- ① **ENGINEERING HELP** on time-losing operating problems;
- ② **TESTED MAINTENANCE SCHEDULES** that minimize service man-hours—keep equipment on the job;
- ③ **PROMPT, DEPENDABLE DELIVERY**—a reliable, on-the-job service that eliminates inventory problems for you!

TUNE IN "INFORMATION PLEASE"—MONDAY EVENINGS, 9:30 E.W.T.—NBC



1/2, 1, 1 1/2 AND 2-TON CAPACITIES NOW READY . . . OTHERS ON THE WAY!

BUY VICTORY BONDS

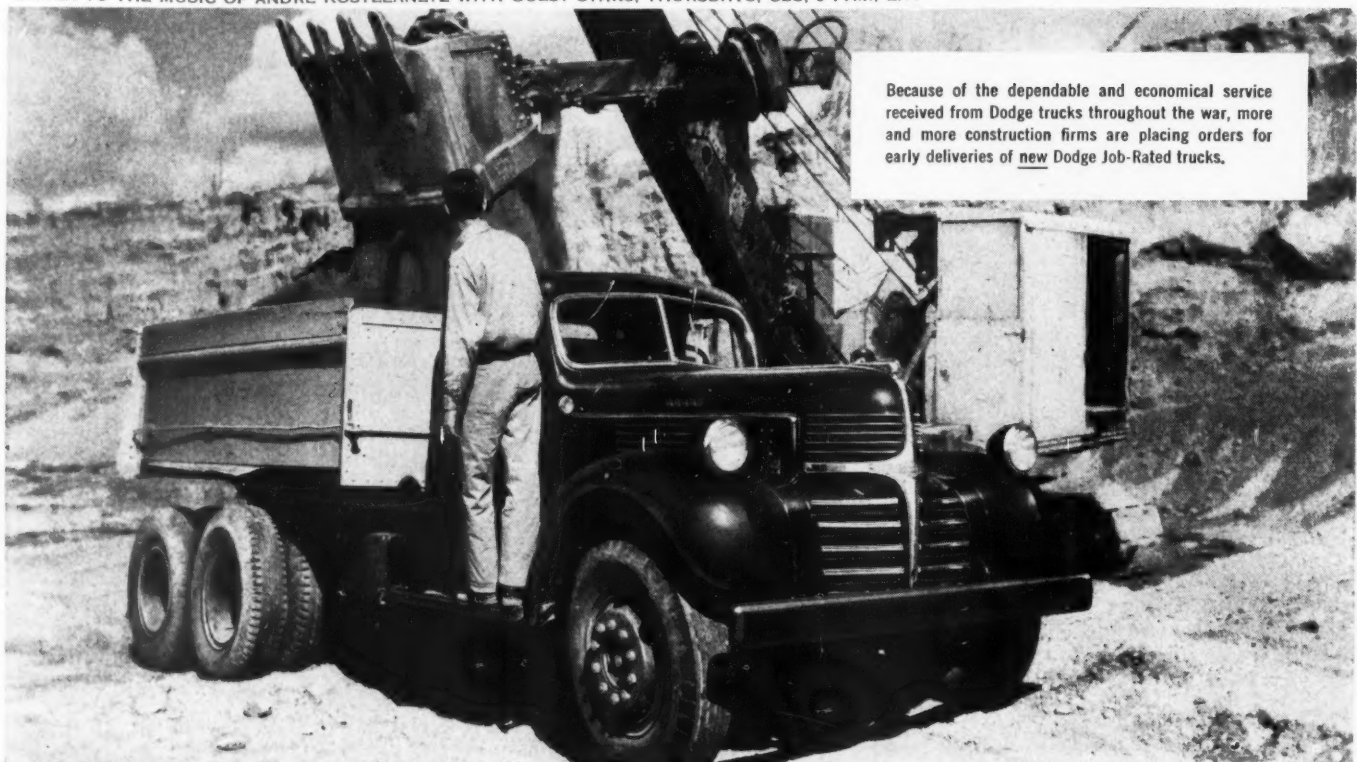


YOU'LL like the way these new and improved trucks cut *your* hauling costs. You'll like the way Dodge engineers have designed them to *fit* your hauling requirements. You'll find that these *Job-Rated* trucks have exactly the *right* engine, the *right* size frame, transmission, clutch, rear axle and every other unit to give *maximum* performance at *lowest* cost! To *save* money, *invest* your money in new Dodge *Job-Rated* trucks!

DODGE DIVISION of CHRYSLER CORPORATION

NEW DODGE *Job-Rated* **TRUCKS**

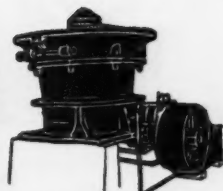
LISTEN TO THE MUSIC OF ANDRE KOSTELANETZ WITH GUEST STARS, THURSDAYS, CBS, 9 P.M., E.T.



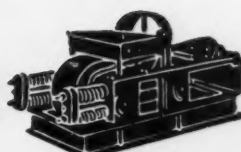
Because of the dependable and economical service received from Dodge trucks throughout the war, more and more construction firms are placing orders for early deliveries of new Dodge Job-Rated trucks.



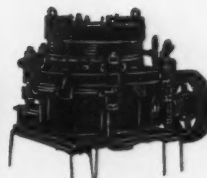
JAW CRUSHERS



PRIMARY BREAKERS



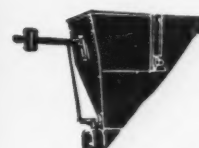
ROLL CRUSHERS



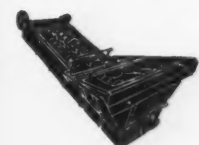
INTERCONE CRUSHERS



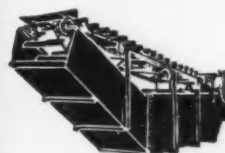
PULSATORS



SAND TANKS



SAND CLASSIFIERS



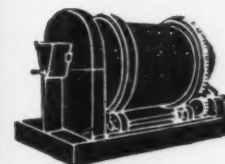
SAND DRAGS



LOG WASHERS



SCREW REWASHERS



SUPER SCRUBBERS



BELT AND BUCKET ELEVATORS

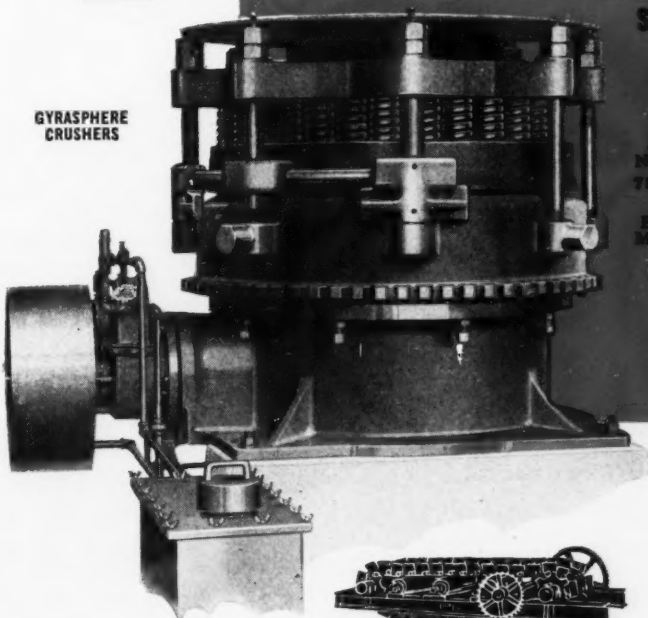


CONVEYORS

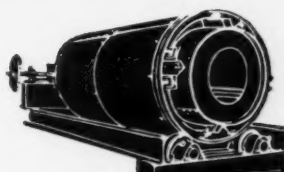


GRIZZLIES

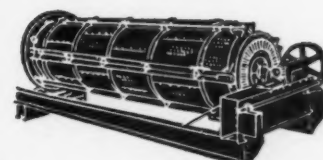
GYRASPHERE CRUSHERS



HEAVY DUTY FEEDERS



WASHING SCREENS



DRY SCREENS

E-9

New Edition
FREE
... for the
latest in EQUIPMENT
get this **GUIDE**

You have to look ahead these days! Line up your equipment *now* . . . be all set to push your production to new peaks and bigger profits. This new 36-page illustrated equipment guide will help you . . . whether you're expanding or modernizing your present plant, or building a brand new one. It gives you the latest developments in rock, ore and gravel handling machinery. Shows you exactly how to pick the right type, model or size that will best fit your particular needs. Ask for new Telsmith Equipment Guide E-10.

TELSMITH

SMITH ENGINEERING WORKS
510 E. CAPITOL DRIVE
MILWAUKEE 12 • WISCONSIN

Cable Address: Sengworks, Milwaukee—Concrete, London
51 East 42nd St. New York 17, N. Y. 211 W. Wacker Drive Chicago 6, Ill.
713 Commercial Trust Bldg. Philadelphia 2, Pa. 247 Third Street Cambridge 42, Mass.
Beckel Eqp. Co. Milwaukee 3, Wis. Brandels M. & S. Co. Louisville 8, Ky.

Mines Eng. & Eqp. Co. San Francisco 4, Los Angeles 14
Risk Equipment Co. Charleston 22, and Clarkburg, W. Va.
Risk Equipment Co. Roanoke 7, and Richmond 10, Va.
Wilson-Woodner-Wilkinson Co. Knoxville 8, and Nashville 6, Tenn.



**JOB-
PROVED**

TOURNAPULLS

SPEED HANDLING FOR LEONARD &

PROBLEM

To handle 636,000 yards on 2½ mile section of U.S. 99 realignment north of Woodland, Washington. Dangerous mountain curves eliminated by widening and straightening. Material — earth and rock largely from a long sidehill cut. Long hauls — up to a mile round trip — had to be made over present highway without closing route to normal traffic. Fill area was across low lands and a swamp

Manufacturers of Tournapulls*, Angledozer*, Bulldozers, Tiltbozers*, Carryall* Scrapers, Power Control Units, Rooters*, Tournatrailers*, Tournacranes*, Tournatrucks*, Sheep's Foot Rollers, Tournarope*, Tournaweld*, Tournalifts*.

* Trade Mark Reg. U. S. Pat. Off.

LETOURNEAU

PEORIA, ILLINOIS • STOCKTON, CALIFORNIA

...TOURNATRAILERS

OF 636,000 YD. JOB SLATE ON U.S. 99

SOLUTION

To profitably meet these difficult job conditions of steep grades, tough materials and open-traffic haul route, Contractors Leonard & Slate used 8 rubber-tired, fast-moving Tournapulls, with them moved most of the yardage. 5 Tournapulls with 15-yard Carryalls handled tough rocky scraper "dirt"; 3 with 17-yard Tournatrailers hauled shovel rock and slide material. These big rubber-tired rigs provided plenty of traction in the rough cuts and up steep grades, high hauling speed on the pavement and good flotation in the soft swampy fill. Rooting, clearing, pioneering and other specialized jobs were handled with supplementary LeTourneau tractor tools.

RESULTS

Thus, Leonard & Slate moved about 95% of the total job yardage with their LeTourneau fleet. Typical production in tight, rocky hardpan, which had to be rooted, showed each Tournapull-Carryall rig averaged 55 pay yards per hour on a 4600' round trip haul. This, in spite of 18 to 20% return grades plus delays entering heavy traffic stream on main highway haul.

Profitably handling rugged jobs with Tournapulls is not new to Contractors Leonard & Slate. They originally used 6 smaller Tournapulls on some of the West's toughest jobs.

C34



Tough rocky hardpan was loosened by LeTourneau heavy duty Rooter using two teeth.



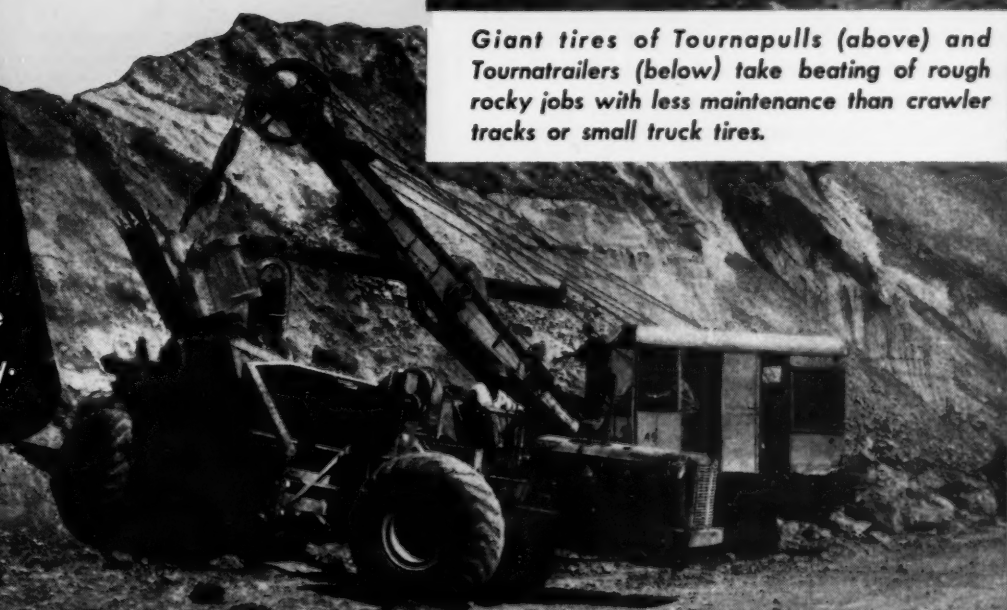
Tournapulls' ability to haul over highway without traffic interference or damage to pavement saves time, cuts haul road expense.



Giant tires of Tournapulls (above) and Tournatrailers (below) take beating of rough rocky jobs with less maintenance than crawler tracks or small truck tires.

INVESTIGATE

check the extra profit possibilities of Tournapull as your major dirtmoving equipment ... this is the modern job-proved method ... it is simpler, more flexible ... faster on both long and short hauls ... it has proved its ability to give lowest net costs per yard! For facts and figures, see your LeTourneau distributor today.



"Repair work reduced to a minimum"



**MACMILLAN
RING-FREE
MOTOR OIL**

"...our business... construction and heavy lifting, pays off strictly on performance with no alibis accepted.

...we have been using Macmillan Ring-Free Motor Oil in all our equipment* for the last four years with uniformly satisfactory results.

...most of our equipment is in continuous operation, six days a week, in all kinds of weather. We notice the advantage of Macmillan Ring-Free especially in winter when our men are able to start the motors with 2 or 3 turns of the crank, even on the coldest mornings.

...during the four years we have been using your oil, we have not had a single burned bearing or breakdown because of carbon on the rings...our repair work has been reduced to a minimum.

...in these days when repairs and replacements are difficult, Macmillan Ring-Free has stood by us like a good friend."

*Excerpts of letter from CRANES, Inc.
— one of a series of testimonial letters
from all parts of the United States.*

J. H. Snyder

Chief Mechanic, CRANES, Inc.,
Maspeth, Long Island

*Equipment operated by Cranes, Inc. includes: two 16-ton Link Belt truck cranes with 120 ft. booms, powered by six cylinder Waukesha motors; three P-H thirty-ton truck cranes powered by Waukesha motors mounted on four cylinder A-C Mack trucks, five to seven years old; two Schramm compressors, one and two tons, respectively, powered by Buda motors; four Hobart welders, powered by six cylinder Chrysler motors; two P-H welders, one mounted on a six year old Ford V-8, and one on a five year old Pontiac 8; a sixteen-ton double drum hoist which is fifteen years old; a 1942 three-and-a-half-ton Mack truck and a 1942 Chevrolet two-ton truck. All on Macmillan Ring-Free, of course!

MACMILLAN PETROLEUM CORPORATION

80 W. 50th Street, New York 20 • 624 S. Michigan Avenue, Chicago 5 • 530 W. Sixth Street, Los Angeles 14 • Copyright 1945, Macmillan Petroleum Corporation

USE *Snap-on* TORQOMETERS

WHEREVER ACCURATE BOLT TENSION IS REQUIRED

DISTORTION caused by inaccurate tensioning of studs and bolts wastes power, promotes wear and is often the cause of mechanical failure. With Snap-on Torqometers precision tensioning is done more quickly and easily than "guesswork" tightening. Even inexperienced workers pull to specified tension every time . . . they see the torque reading as pressure is applied . . . they work swiftly, confidently, *accurately*.

In the manufacture of Diesel engines, Snap-on Torqometers are standard wrench equipment for a wide range of assembly operations. *Wherever Torqometers are used by the maker, it is equally important that they be used in service and maintenance work.*

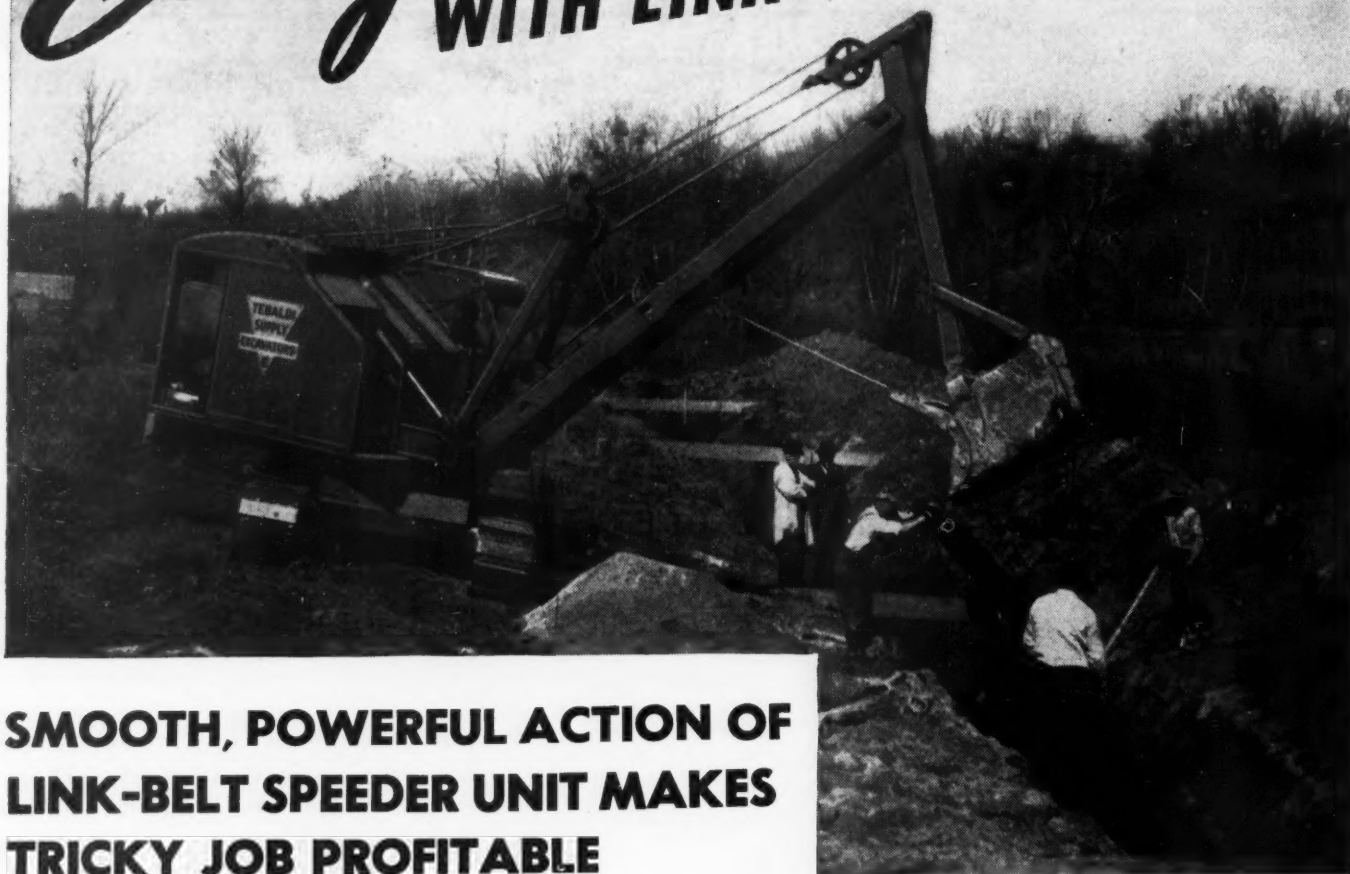
The full range of Snap-on Torqometers is covered in the 1945 catalog of 3000 Snap-on tools for production, assembly, maintenance. Mailed on request. Write, SNAP-ON TOOLS CORPORATION, 8084-J' 28th Ave., Kenosha, Wis.

COMPLETE RANGE
OF TYPES AND SIZES
FOR PRODUCTION
ASSEMBLY
MAINTENANCE

FROM ZERO TO 30 INCH
POUNDS
— UP TO 2000
FOOT POUNDS

Snap-on Tools
THE CHOICE OF BETTER MECHANICS

"Easy - - -
WITH LINK-BELT SPEEDER!"



SMOOTH, POWERFUL ACTION OF LINK-BELT SPEEDER UNIT MAKES TRICKY JOB PROFITABLE

After opening a line of trench, this LS-85 is laying cast iron pipe on a new sewer job for Springfield, Mass., a delicate job that looks easier than it is, and is easier than it might be, without the power, speed and easy control typical of the Link-Belt Speeder machine. Contractors find these features important factors in profitable operations.

QUICK CONVERTIBILITY HELPS, TOO!

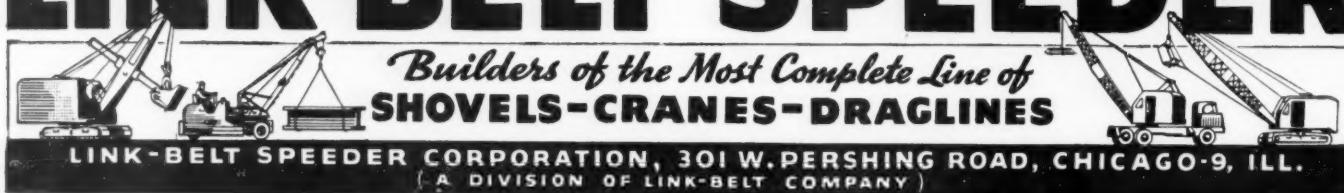
Interchangeable attachments, quickly fitted, enable the Link-Belt Speeder "shovel-crane" to keep profitably busy at a variety of jobs. Link-Belt Speeder "Shovel-Crane" is First Machine on the job, Last to Leave!

*What is YOUR State doing
 about Post-War Construction
 Plans for ROADS . .
 AIRPORTS . . SEWAGE
 TREATMENT AND WATER
 PURIFICATION PROJECTS?*

Millions of jobs and assurance against post-war depression are involved in pending construction programs. Make sure your state is ready to start its program.

For Prompt, Efficient, Convenient Sales and Service:
 There is a Link-Belt Speeder Distributor Located Near You

LINK-BELT SPEEDER



Builders of the Most Complete Line of
SHOVELS-CRANES-DRAGLINES

LINK-BELT SPEEDER CORPORATION, 301 W. PERSHING ROAD, CHICAGO-9, ILL.
 (A DIVISION OF LINK-BELT COMPANY)

Lower Cost Concrete..



MultiFoote Pavers assure you of lower cost concrete because they get the cement and aggregate into the paver and out as thoroughly mixed concrete *faster*. Big, rugged skip has a full, wide mouth for faster charging from even the largest trucks. Double cone drum with its end-to-end scouring action mixes every batch in minimum time. Rotary discharge takes only a quarter turn to dump concrete into the big bucket. High operating platform provides greater visibility and faster, more accurate work. Write for details.

Lower Cost Black Top

Handling any mix—hot or cold—Adnun Black Top Pavers lay a smoother final surface, faster and at lower cost. With a new, 6-cylinder engine, it has still more power for handling the heaviest trucks, uphill or down. Experienced road men who have worked with other pavers agree that the low maintenance costs of an Adnun are far below those usually encountered with other machines. Check these advantages today.



the FOOTE co.

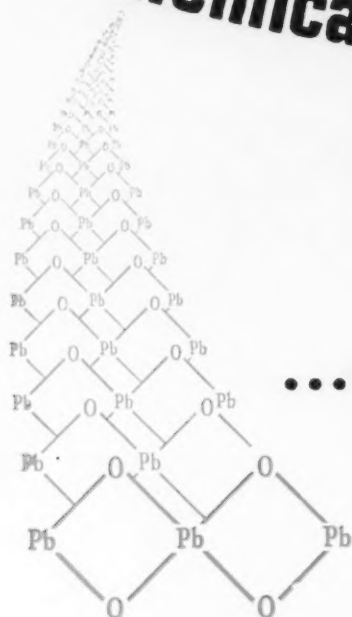
I N C O R P O R A T E D

1910 State Street ★ Nunda, N. Y.

The World's Largest Exclusive Manufacturers of Concrete and Black Top Pavers



Uniformity of Chemical Composition



...another real reason why **RED LEAD**
means Extra Protection against Rust

Red Lead's outstanding uniformity of performance results not only from its extreme purity but also from its precise chemical composition... lead orthoplumbate. This makes for predictable chemical behavior.

For many years Red Lead has been the standard among metal protective paints because of inherent fundamental properties of the pigment itself.

Among the most important of these is Red Lead's definite chemical composition and uniformity—as distinguished from pigments which have indefinite composition or vary from batch to batch, with resulting possibility of variation in performance.

One reason for this uniformity is that Red Lead is a simple chemical compound, being made from oxygen and high purity metallic lead. Consequently, Red Lead is an extremely pure compound. It contains no corrosion accelerating impurities such as water-soluble salts of chlorides or sulfates.

Uniform composition means dependable performance, day after day, job after job.

Furthermore, Red Lead has the property of counteracting acid conditions, recognized as accelerators of rust. In the presence of various acids, Red Lead forms

insoluble neutral lead salts at the approximate rate at which the acids are supplied. This is true whether the acids originate from acid forming environments, such as gas, smoke and moisture in the atmosphere, or from the decomposition of the vehicle. Thus, a rust inhibiting condition is maintained with a Red Lead paint.

Remember, too, that Red Lead is compatible with practically all vehicles commonly used in metal protective paints, including phenolic and alkyd resin types.

Specify **RED LEAD** for All Metal Protective Paints

The value of Red Lead as a rust preventive is most fully realized in a paint where it is the only pigment used. However, its rust-resistant properties are so pronounced that it also improves any multiple pigment paint. No matter what price you pay, you'll get a better paint for surface protection of metal, if it contains Red Lead.

Write for New Booklet

"Red Lead in Corrosion Resistant Paints" is an up-to-date, authoritative guide for those responsible for specifying and formulating paint for structural iron and steel. It describes in detail the scientific reasons why Red Lead gives superior protection. It also includes typical specification formulas. If you haven't received your copy, address nearest branch listed below.

* * *

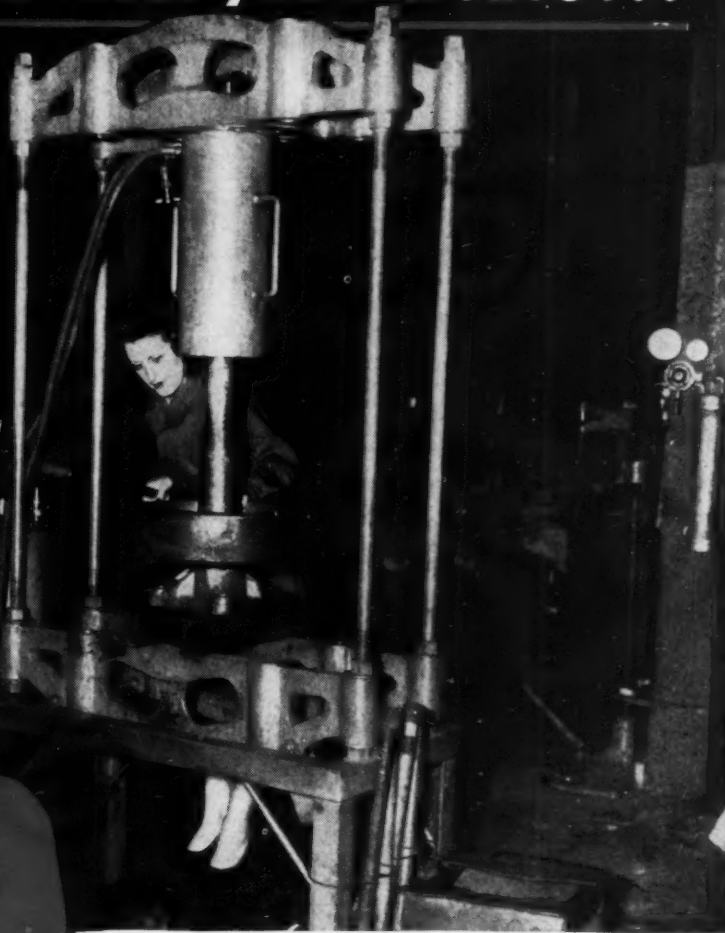
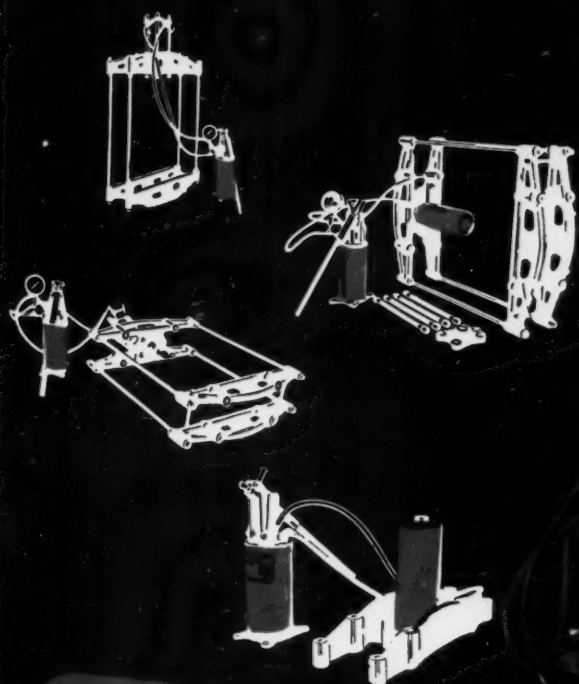
The benefit of our extensive experience with metal protective paints for both underwater and atmospheric use is available through our technical staff.



NATIONAL LEAD COMPANY: New York 6, Buffalo 3, Chicago 80, Cincinnati 3, Cleveland 13, St. Louis 1, San Francisco 10, Boston 6 (National-Boston Lead Co.); Pittsburgh 30 (National Lead & Oil Co. of Penna.); Philadelphia 7 (John T. Lewis & Bros. Co.)

DUTCH BOY RED LEAD

think of the time and labor you can save . . .



with this Rodgers
**portable
 hydraulic press
 of 100 uses . . .**

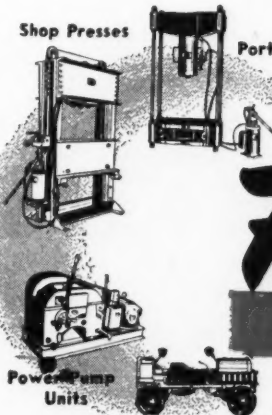
Here is the handiest time-and-trouble-saving piece of equipment you can have around for maintenance, service and special jobs—any place that you may need 50 to 200 tons of easily portable hydraulic power.

The Rodgers Universal Press is the ideal answer for pulling gears, pinions and wheels; for pressing shafts, bushings and pins; for clamping and jacking operations. It is used on a stand as an ordinary press, or on its side horizontally. Tie rods are quickly disassembled to fit the press around a large piece of equipment and they may be lengthened with extension rods. Frame may be used in full or narrow width—cylinder is mounted either between upper frame members or suspended below. Tested special alloy steel assures great strength for safety and ruggedness. Power is supplied by either the Rodgers 4-speed Hand Pump or power-operated pump unit.

A Rodgers Universal will pay for itself over and over in the time and labor it will save you—we believe you will find it almost indispensable. *Write now* and let us send you all of the facts.

Shop Presses

Portable Presses

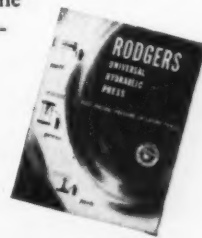


Power Pump Units

Crawler-Track Presses

Send for this interesting booklet . . .

It will give you complete information and details about Rodgers Hydraulic Presses. No obligation, of course, and you can profit by it.



Rodgers Hydraulic, Inc.
 hydraulic power equipment



7403 Walker St., St. Louis Park, Minneapolis 16, Minn.

A.W. BADGER



With the Badger, only the bucket, boom, turntable and mast swing. The heavy main deck, engine, transmission and main frame are STATIONARY—to counterbalance heavier loads and avoid objectionable tail-swing.

The Badger makes more swings per minute, day, month and year . . . wastes no fuel or power swinging extra weight . . . digs the hardest "diggable" material . . . can work in closer quarters.

Profits are made by working fast and saving time. Clipping a few seconds off each dig-swing-dump cycle means more yardage at the close of the day.

Released from its duties with the Armed Forces, the Badger is once again available for prompt delivery. Your nearby A-W Distributor will be glad to tell you the whole story.

AUSTIN-WESTERN COMPANY, AURORA, ILLINOIS, U. S. A.

R SHOVEL



TRENCH-HOE

CONVERTIBLE TO..

ILLINOIS—

“Hewing to the line” and leaving a firm, clean, vertical bank.

INDIANA—

Erecting tanks for oil-refining use. Steel sheets weigh about 3 tons.

CRANE



SKIMMER

SO. AFRICA—

Levelling ground for workshop and garage extensions.

PILE DRIVER



IOWA—

Driving 34-foot piling for a new and larger bridge with an 1800-lb. hammer.



CLAM SHELL

WYOMING—

Digging pits and placing dirt around concrete forms for a new overpass at the rate of 300 yds., in 8 hours time.

DRAG LINE



MONTANA—

Cleaning, deepening and widening a creek that serves as a run-off for several mine smelters.

BUILDERS OF ROAD MACHINERY

Austin Western

SINCE

1859

BUY MORE
WAR BONDS

SPEED UP
PEAK LOADS
-GET LOWEST COSTS!



**TOP-QUALITY THAT DELIVERS
COST-SAVING EXTRA SERVICE!**

General Off-the-Road Tires are engineered to handle heaviest hauling at speeds that pay dividends in *extra profits!*

Special tread patterns provide maximum traction and anti-skid protection with the assurance of *fast, free-rolling*. General's "cushioning" principle stops shock concentrations—distributes impact evenly through-

out the carcass. All inner construction is extra heavy duty with dual and triple beads, heat resisting rayon cord and General's exclusive ply-bonding.

General Off-the-Road Tires give you General's own Top-Quality built to a heavy duty standard that assures cost-saving extra service on the toughest jobs.

THE GENERAL TIRE & RUBBER COMPANY
AKRON, OHIO



GENERAL OFF-THE-ROAD TIRES

You Can DEPEND On
Steady TROUBLE-FREE
Performance

WITH THOR SUMP PUMPS

SELF-PRIMING, to pump efficiently under the toughest job or weather conditions, Thor Sump Pumps operate either partially or fully submerged in dirty water, oil, sludge, or sewage. With a capacity of 114 gals. per min. at a 60-foot head under 90 lbs. air pressure, they will *stay on the job* because of these dependable Thor features; *Positive, Automatic Lubricator — Selective Capacity Control — Double-Acting Speed Governor — One-piece, Airtight Housing — "No-Freeze" Large Exhaust System.*

INDEPENDENT PNEUMATIC TOOL CO.

500 W. Jackson Blvd., Chicago 6, Ill.

New York

Los Angeles

*Exclusive Design of
Automatic Lubrication System
KEEPS Thor Sump Pumps on the Job*

- A built-in grease reservoir feeds lubricant to the impeller hub and bearing of the Thor Sump Pump in continuous application under live air pressure. Wear on rings is greatly reduced.

- Oil is fed automatically under pressure to motor parts and cylinder in a fine, continuous spray.



Thor

CONTRACTORS
AIR TOOLS

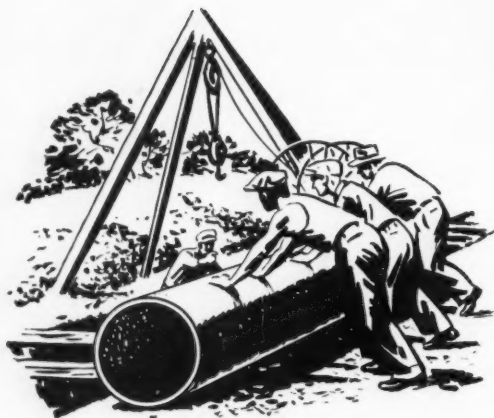
- Rock Drills
- Paving Breakers
- Clay Diggers
- Backfill Tamers
- Concrete Grinders
- Portable Saws
- Sump Pumps

Thor PORTABLE POWER
TOOLS

PNEUMATIC TOOLS • UNIVERSAL AND HIGH FREQUENCY ELECTRIC TOOLS • MINING AND CONTRACTORS TOOLS

THROUGHOUT THE SEWAGE SYSTEM...

Transite Sewer Pipe provides

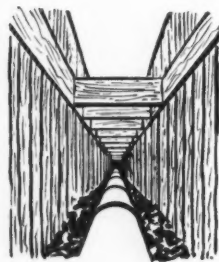


In Gravity Sewer Lines: Transite's unusual characteristics, proved in service in hundreds of communities, assure substantial savings both in installation and maintenance costs.

1. Handling costs are lower

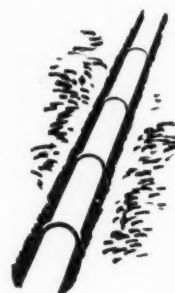
Long 13-foot lengths and light weight mean greater footage per truckload . . . fewer man-hours for handling to lay to line and grade.

2. Smaller diameter pipe may be used



Transite's joints combine tightness with flexibility, guarding against infiltration. Thus total sewage load is reduced, which, coupled with Transite's higher flow capacity, often permits use of smaller diameter pipe.

3. Lower excavation costs are possible



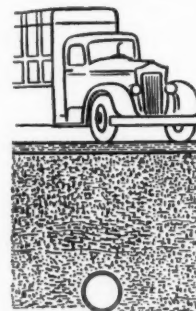
Transite's low friction coefficient ($n=.010$) provides greater flow capacity . . . permits flatter grades, shallower trenches, reduces excavation costs . . . especially important in the case of rock excavation or wet trenches.

4. Pipe laying costs are reduced



Four classes of pipe, to meet a wide range of strength requirements for all loading conditions, minimize need for costly concrete cradles. Transite's long lengths mean fewer joints to assemble.

5. Maintenance costs go down



Made of asbestos and cement, Transite Sewer Pipe is highly corrosion-resistant. Its tight joints guard against root trouble. And every length is factory-tested for strength and uniformity.



Johns-Manville

...these 7 special economies



And In Treatment Plants: Transite Sewer Pipe's light weight and long 13-foot lengths cut infiltration to a minimum, resulting in smaller loads for the treatment plant to handle, and effecting important economies in operation.

6. Treatment costs are less— plant capacity conserved

By cutting down on infiltration and reducing plant load, operating costs are lowered, conserving plant capacity for increased loads incident to future community growth.



7. Smaller treatment plants are possible

In designing new sewage facilities, Transite Sewer Pipe's reduced infiltration makes possible smaller treatment plants with substantial savings in the initial cost of both buildings and equipment.



and for pressure mains...

TRANSITE PRESSURE PIPE

For the pressure portions of the sewerage system, Transite Pressure Pipe assures the same economies of lowered installation and maintenance costs. Its high flow capacity ($C=140$) and freedom from tuberculation help keep pumping costs low.

For additional information about Transite Sewer Pipe, write for Brochure TR-2IA (for gravity lines) and TR-IIA (for pressure mains). Address Johns-Manville, 22 East 40th Street, New York 16, N. Y.

e Transite Sewer Pipe

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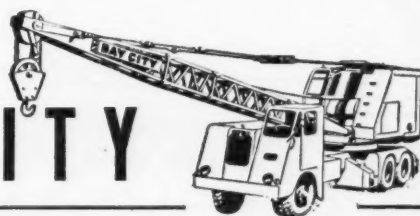
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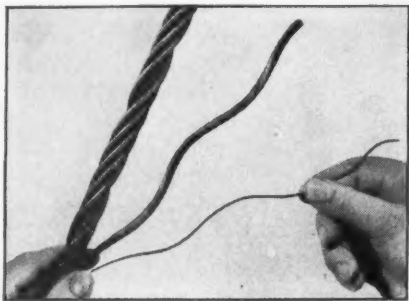
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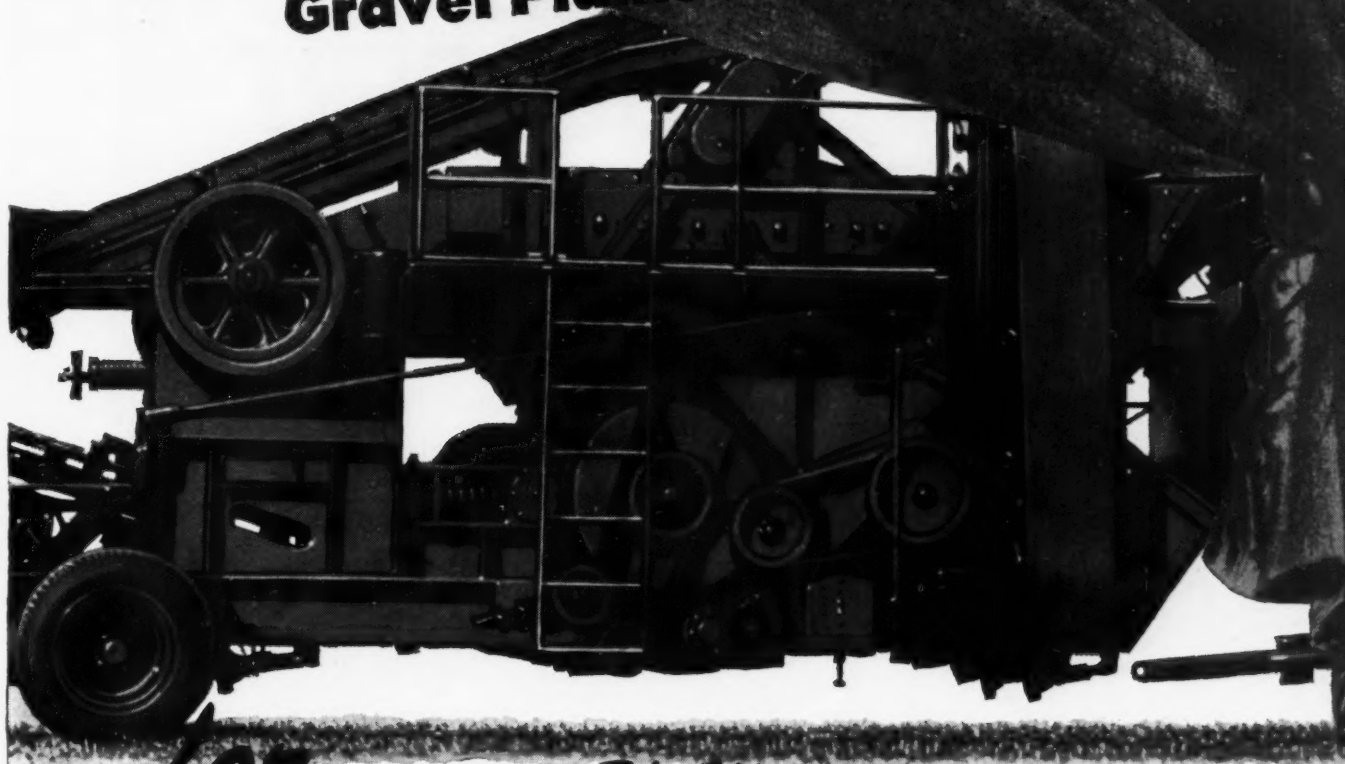
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NO. 837

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**3 Great New Cedarapids Tandem Straightline
 Gravel Plants for Tomorrow's Jobs**



for **BIG Jobs — The Master**
MEDIUM Jobs — The Junior
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THREE new Cedarapids plants, differing only in size, will be ready for work on your 1946 contracts. Engineered and job-tested to rigid Cedarapids performance and economy standards, they will give you the production margin to make low-bid contracts show a good profit.

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See your nearby Iowa distributor for complete details on these new Cedarapids Tandem Straightline Plants, or write direct.

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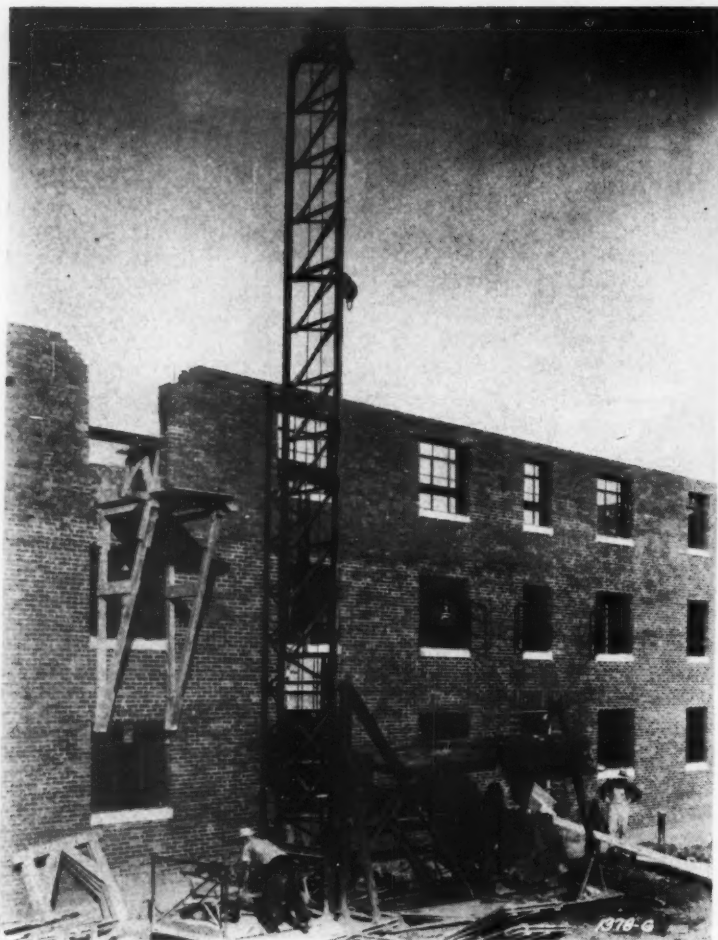
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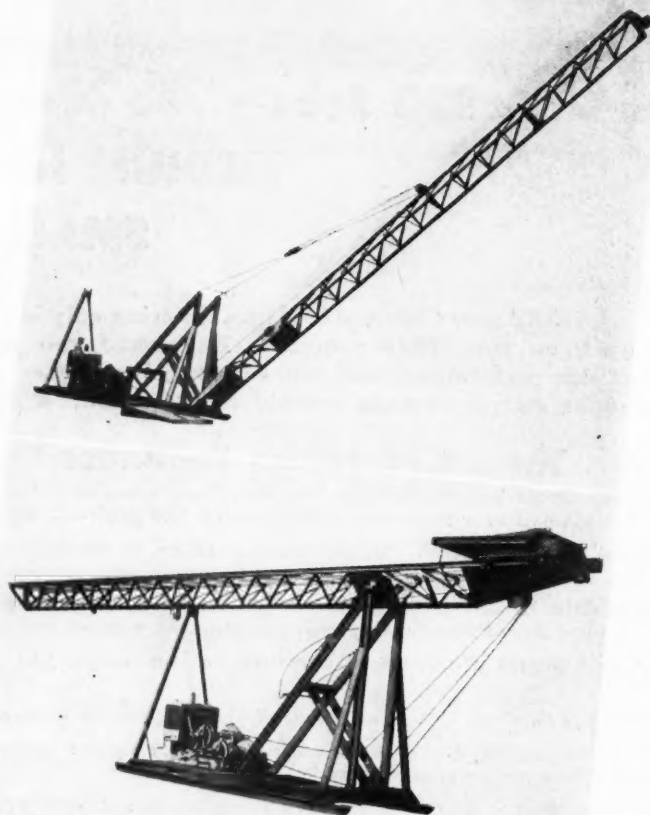
These self-contained, steel elevator towers can be quickly erected, operated without guy lines or bracing and can be easily moved around the job without dismantling.

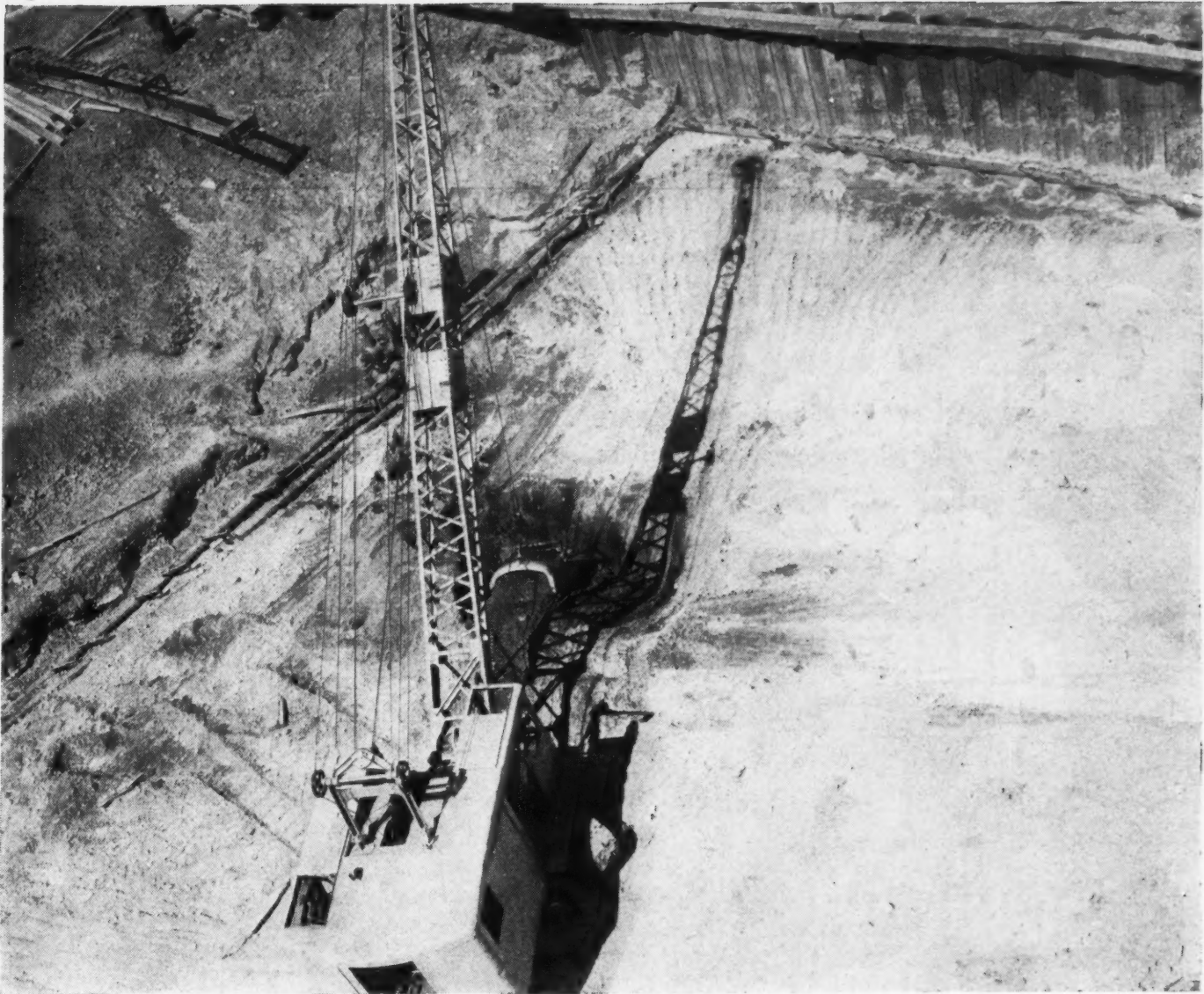
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The Sure-Grip's deep, self-cleaning *open center* tread delivers super traction because its husky, non-skid lugs hold their bite and so pull better, slip and spin far less. And the All-Weather Earth-Mover is sure-footed and easier-rolling because it's built with wide, rounded contours — combines low roll-resistance with low inflation to prevent deep penetration of the ground surface.

And because both these Goodyears are true high-hour performers — so proved on the toughest construction jobs — more and more contractors are using them. It will pay you to buy — and specify — Goodyears.

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GOODYEAR

MORE TONS ARE HAULED ON GOODYEAR TRUCK TIRES THAN ON ANY OTHER KIND

Construction Methods

ROBERT K. TOMLIN, Editor

Volume 27

OCTOBER, 1945

Number 10

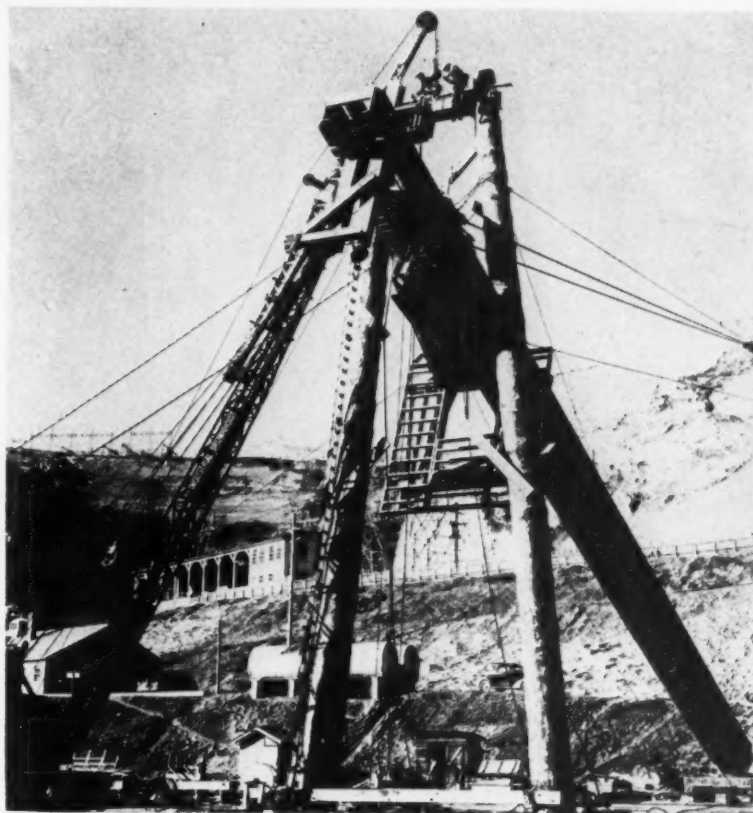
A-Frame and Hoist Raise *90-Ton Mast* For Grand Coulee Cableway



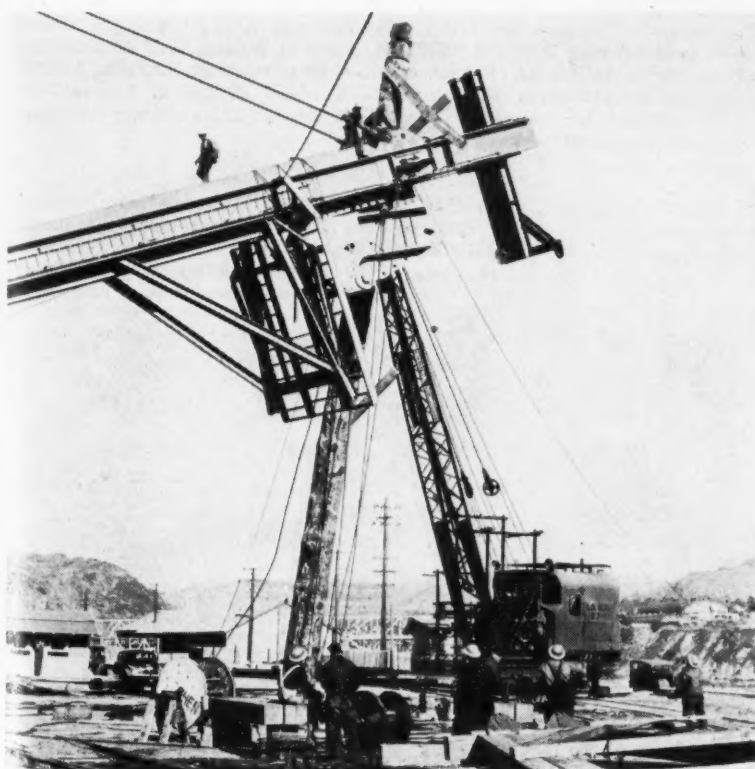
RIGGER POURS ZINC into cable jewel for back guys of 90-ton head tower of cableway.

ERECTED BY MEANS OF an A-frame and electric hoisting rig the 90-ton steel mast—shown in views on this page—will serve as a head tower for a 50-ton cableway across the Columbia River at Grand Coulee Dam. The mast was fabricated by Bureau of Reclamation mechanics, from 36-in. I-beams left over from construction work on the dam.

The cableway will be used in building and servicing a floating caisson by means of which underwater concrete below the dam will be replaced as heavy summer floods gradually wear it away.



A-FRAME made up of heavy timber and steel cross-beam raises mast 70 ft. from horizontal position.



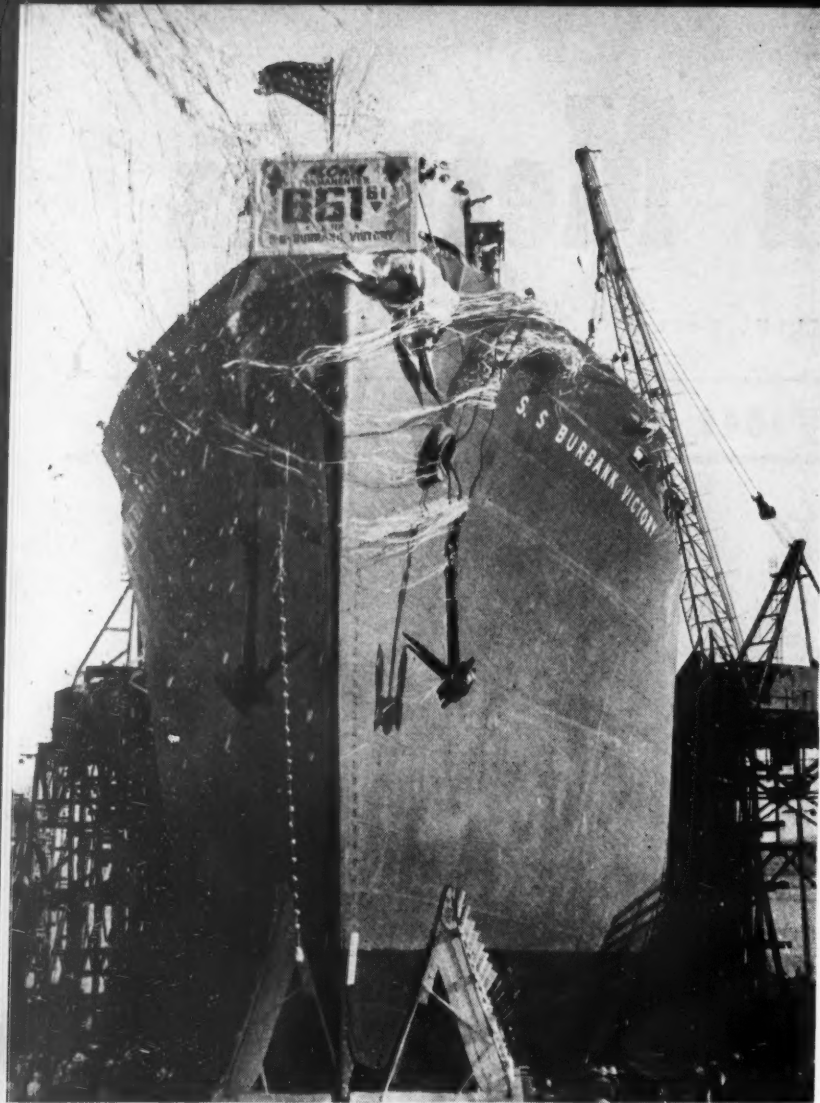
← **AFTER LIFTING MAST** in first stage of raising operation, A-frame is dismantled. Heavy steel cables, kept taut by locomotive crane on one side and 10-ton tractor on other, prevent side sway of tower during erection.

Bureau of Reclamation Photos

→ **PULLED INTO VERTICAL POSITION** by hoisting rig, mast is made ready for use as head tower of cableway. Tower is located on west bank of Columbia River, downstream from Grand Coulee Dam. Smooth-surface track cable, 3 in. in dia., extends across river to movable tail tower 2,300 ft. away.



THIS MONTH'S NEWS REEL



LAST VICTORY SHIP is launched by Permanente Metals Corp. at Richmond, Calif. Named "Burbank Victory," it is 440th ship launched in Yard Two, 661st for Permanente yards and 745th for all Richmond shipyards. It marks end of first gigantic chapter in yard's history. Fore 'n' Aft Photo

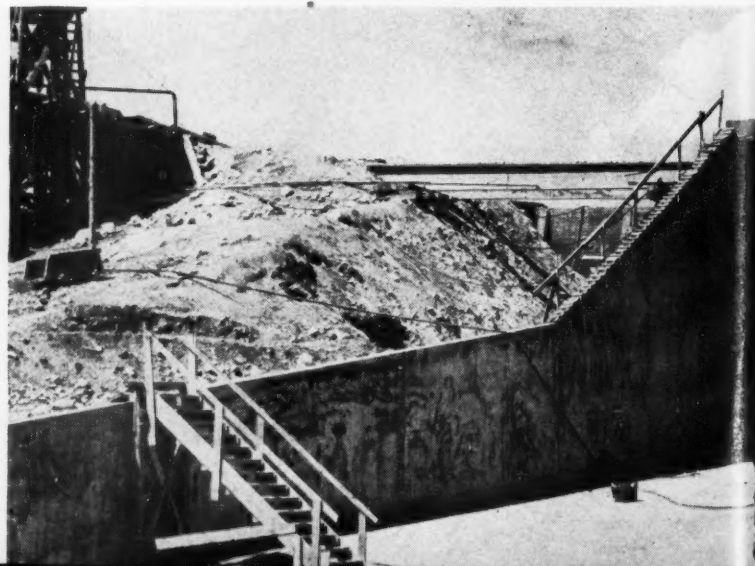
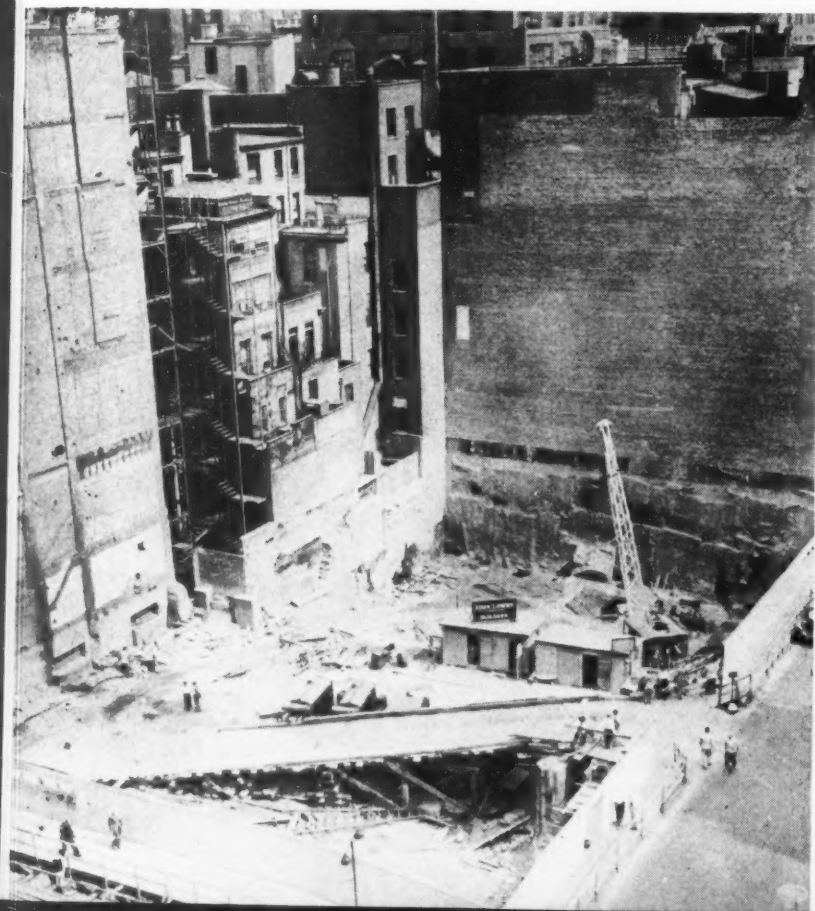
Page 76

EXCAVATION is under way for new department store building of Best & Co. (below) at 51st St. and 5th Ave. in New York City. Contractor is John Lowry of New York. Wide World Photo



RETURNED VETERANS are receiving combined on-the-job and university training to qualify them as construction estimators in program sponsored by Builders and Traders Exchange of Detroit, Mich., with co-operation of Wayne University and Veterans Administration. Pictured (left to right) are: **DUDLEY NEWTON**, head of Wayne Civil Engineering Department; **BRUCE RAYMOND**, acting chief of training, Veterans Administration Rehabilitation Division; **LIEUT. JACK SPENCER**, former B-17 pilot enrolled in program; and **EDWIN BRUNNER**, secretary-manager, Builders and Traders Exchange.

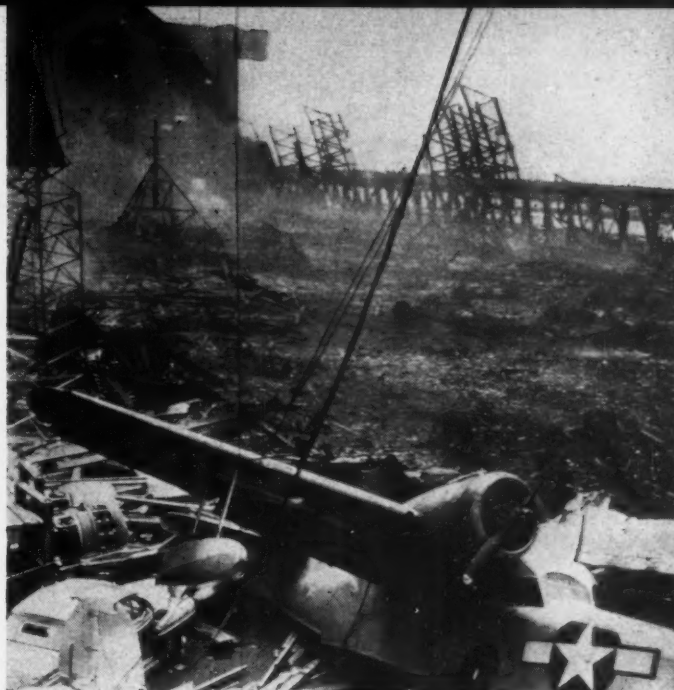
FLOAT-CONTROLLED GATES (below) are installed in spillway of Shadow Mountain Dam, near Grand Lake, Colo., to control level of reservoir. These two 21,650-lb. radial gates, 18 ft. wide and 20 ft. high, will remain open during dam con-





PIPELINE ACROSS PANAMA ISTHMUS is now almost completed as dual system. In operation for almost two years, though part of line has been under construction during that time, it now has daily capacity of about 360,000 bbl. of gasoline, fuel oil and diesel oil. Originally designed as single 20-in. supply artery in case of damage to Panama Canal, it proved so useful that it was made into double line. It runs about 46 mi. between Cristobal and Balboa, C.Z. Total cost is about \$20,000,000.

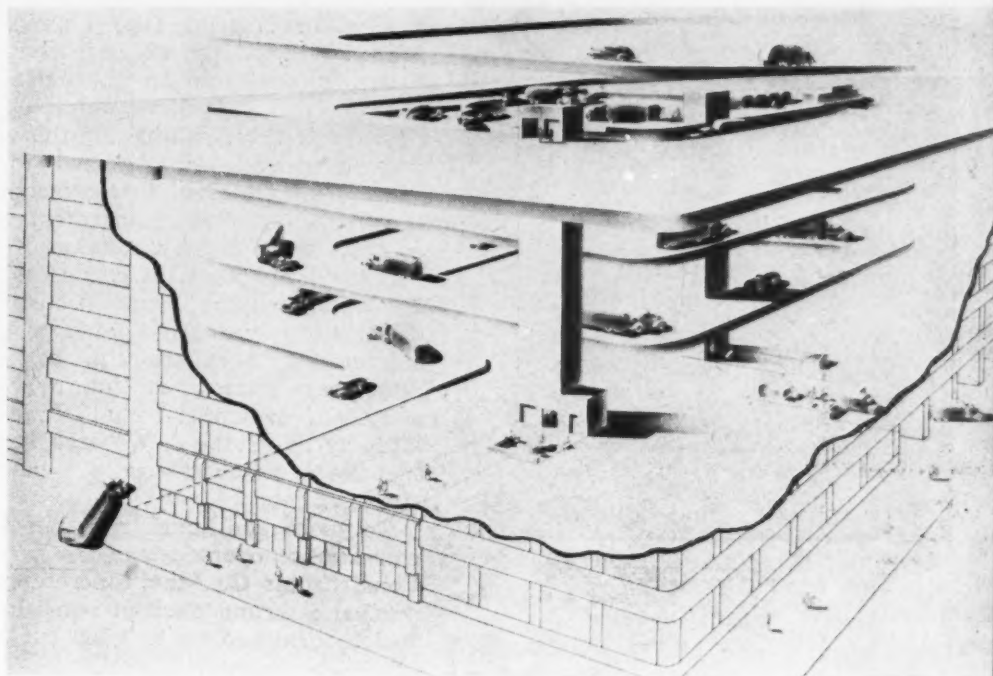
British Combine Photo



MAMMOTH HANGAR is destroyed by fire during tropical hurricane that roared over tip of southern Florida Sept. 15. Two other hangars at Richmond Naval Air Station were also burned during storm which resulted in loss of 366 planes and 25 blimps.

Press Association Photo

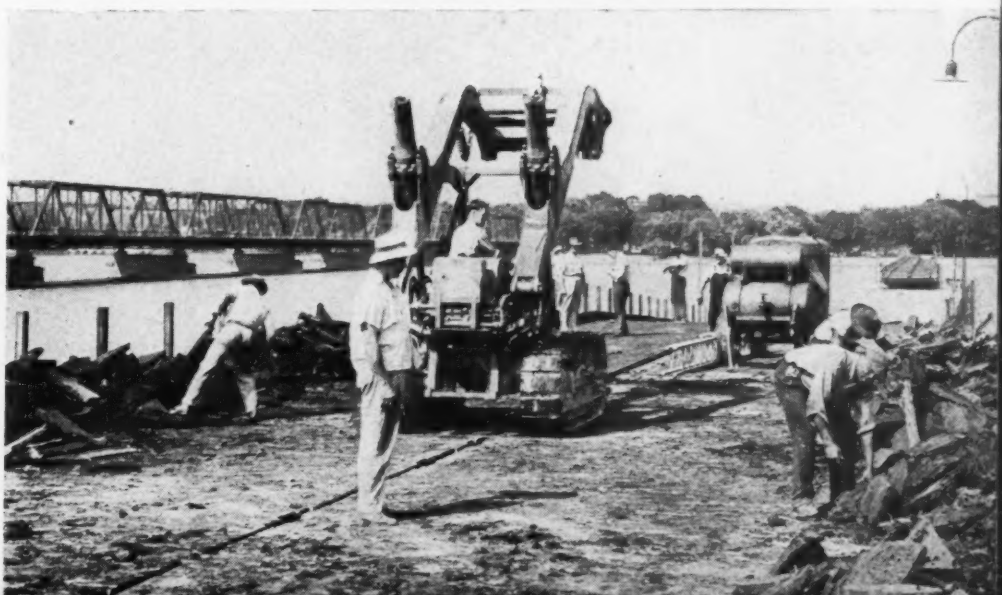
BUILT-IN BOULEVARD 32 ft. wide provides unrestricted two-way truck traffic from street to loading and unloading platforms on each floor in foresighted design of 13-story Interstate Commerce Center, industrial building to be erected as soon as materials become available by Tishman Realty & Construction Co. in downtown Manhattan on site of New York Central's old St. John's Park freight terminal. Vast size of building, affording four acres of floor space on each level, makes it possible to incorporate broad highway of 6½ percent grade in reinforced-concrete structure, eliminating need for truck elevators and expediting freight deliveries. Construction is estimated to cost more than \$15,000,000. Victor Mayer, New York, is engineer and Charles M. Chuckrow is in charge of construction for owner.



struction to permit diversion of North Fork of Colorado River through spillway. Contractor for U. S. Bureau of Reclamation is J. F. Shea Co., Inc., of Los Angeles, Calif., and gates are products of Pittsburgh-Des Moines Steel Co.

PONTON BRIDGE ACROSS POTOMAC (below) is removed as emergency ends. Other ponton spans linking Virginia and Washington, D. C., will also be dismantled. Work is done by Arundel Corp., of Baltimore, Md., under supervision of Col. John M. Johnson, district engineer for U. S. Army Engineers. At work in foreground is dozer-shovel attached to tractor.

Acme Photo



Coordinated Transit-Mix Plant Furnishes Large Concrete Volume for Atomic Bomb Project

By JOSEPH H. DIXEY, President, Joseph H. Dixey Co., New York, N. Y.



JOSEPH H. DIXEY

Blank & Steller Photo

TO SUPPLY A LARGE VOLUME of concrete at an unfailing daily rate running up to a stipulated maximum of 2,500 cu. yd. for the Clinton Engineer Works of the Manhattan District (the atomic bomb project), the Corps of Engineers, U. S. Army, entered into an unusual contract with the Transit-Mix Concrete Corp., New York City, calling for this firm to deliver concrete as directed to other prime contractors of the government in the field. Original requirements of the contract were met by erection of a central batching plant, of a type indicated by accompanying illustrations, which consistently averaged 225 cu. yd. per hr. delivered by 5-yd. truck mixers hauling an average distance of 2 mi. over as fine a system of traffic-bound stone roads, built by the Stone & Webster Engineering Corp., as ever was seen on a construction job.

To meet additional requirements for construction operations of the J. A. Jones Construction Co., the concrete supplier erected a second plant of equal capacity, which furnished up to 1,500 cu. yd. in a

day. At the peak, 58 5-cu. yd. mixer trucks operated from the two plants. Total volume of concrete delivered under the contract exceeded 500,000 cu. yd.

Consistent, dependable delivery of concrete was the prime requirement of the contract. Adequate replacements for all machinery and moving parts were stocked at the start of the job, and plant maintenance was carried on at night and on Sundays. No time was lost as the result of a breakdown during the course of the work.

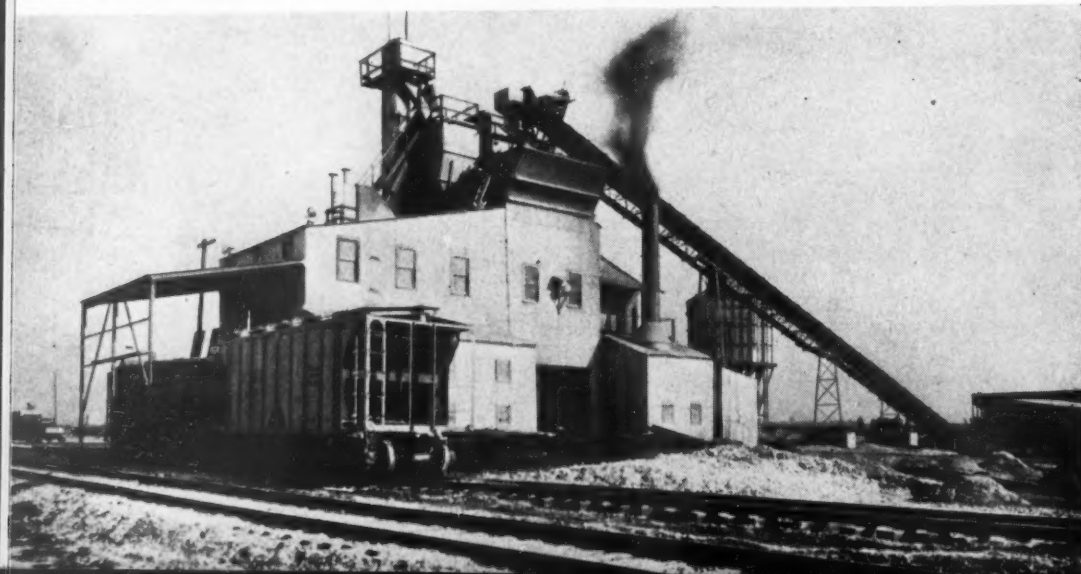
Aggregate Supply

Local conditions and the extreme necessity for uninterrupted progress on the job presented several problems not found in normal heavy construction. Because construction of the TVA dams had exhausted most of the known sand and gravel deposits in the Tennessee River, within economic hauling distance of the project, it was necessary to develop adequate sources of sand and coarse aggregate elsewhere. These deposits had previously shown an excess of coarse aggregate; consequently it was feared the quantity of sand would be insufficient.

Tremendous quantities of fine and coarse aggregate required for the project necessitated a large processing plant. A subcontract for furnishing and delivering the aggregate was awarded to the Birmingham Slag Co. Material was dredged from the river, processed on the dredge and towed 20 mi. to a dock on the Clinch River at the west end of the reservation, where it was unloaded and stockpiled, to be reloaded into trucks. Large end-dump trailer trucks of 16-yd. capacity hauled material 14 mi. from this location to batching plant No. 1.

As additional work was authorized and the quantity of concrete was increased, it became apparent that the supply of sand and gravel would be inadequate for completion. Arrangements were made with the Stone & Webster Engineering

FEATURES OF PLANT are duplicated in this installation (below) of similar facilities at another location. Bulk cement unloaded from hopper cars by undertrack screw conveyor passes to bucket elevator which lifts material to overhead auxiliary hopper, with overflow return to ground storage bin. Inclined 30-in. belt delivers aggregates to turnhead over bin compartments.



Corp., a prime contractor, to supply to Plant No. 1 crushed stone produced by that firm's subcontractor for roadwork. As this stone proved suitable for concrete aggregate and was available in considerable quantity, it was used in the concrete for the remainder of the job. Graded crushed stone was trucked from the quarry to the batching plant, a distance of 2 mi. Sand for fine aggregate was hauled about 240 mi. on railroad cars from Montgomery, Ala., the nearest plant which could produce sand in sufficient quantity.

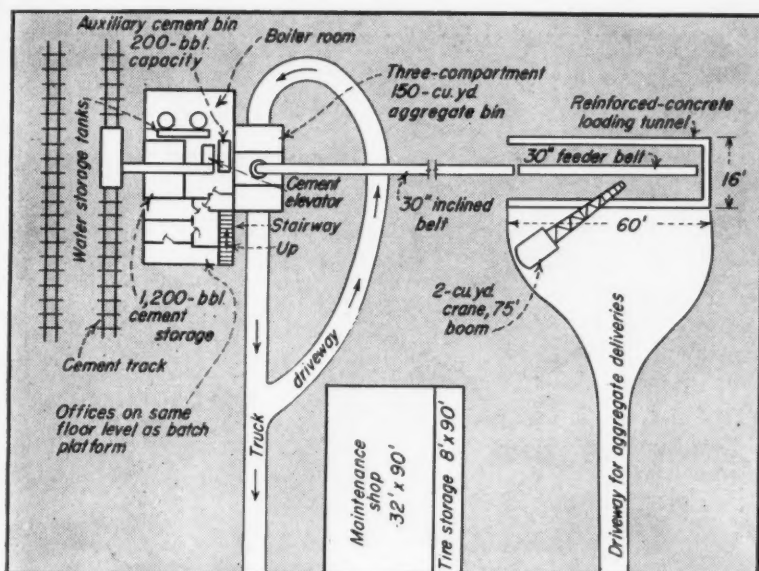
Plant No. 1

One of the conditions of the contract provided that the contractor install equipment capable of producing a maximum of 2,500 cu. yd. of concrete per day. The location of the batching plant, or plants, was of vital importance. By careful location of Plant No. 1, a well-equipped and efficiently operated batch-

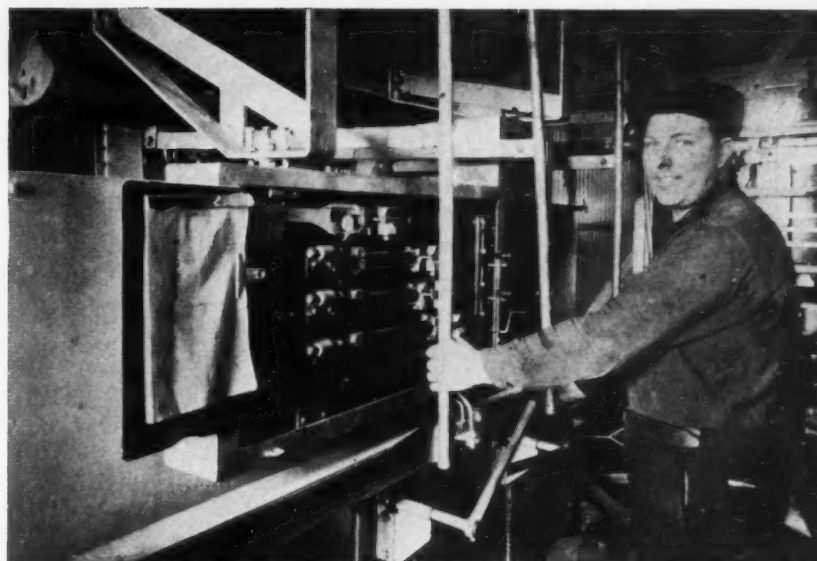
THE AUTHOR

Joseph H. Dixey was vice president of the Transit-Mix Concrete Corp. from its inception in 1929 until December 1, 1944, when he resigned. He has been engaged in the ready-mixed concrete business since May, 1927, when the first commercial concrete plant was established in New York City. He is a former president of the National Ready-Mixed Concrete Association. During the period from December, 1940, to December, 1944, he handled all the ready-mixed concrete

required in the construction of the Elwood Ordnance Works, Kankakee Ordnance Works, Volunteer Ordnance Works, Letterkenny Ordnance Works, Republic Steel Mill at South Chicago and the Clinton Engineer Works. He is presently engaged in consulting practice for concrete and sand and gravel plants and equipment, and he plans to start operation of a ready-mixed concrete business under his own name in the spring of 1946.



BATCH PLANT for 5-cu.-yd. truck mixers is set up on railroad siding for delivery of bulk cement by hopper cars. Aggregates are hauled in by large trailer trucks and are stockpiled over concrete feeder tunnel in volumes sometimes exceeding 35,000 cu.-yd. by 2-yd. crane with 75-ft. boom.



BETTERING THIS ARRANGEMENT at Elwood, Ill., where Walter Olsen, batch operator, hits 300-cu.-yd.-per-hr. rate on several occasions, beam box of similar plant at Clinton Engineer Works has live tare beam, making five beams in all, to speed weight-measuring of 5-yd. batch.

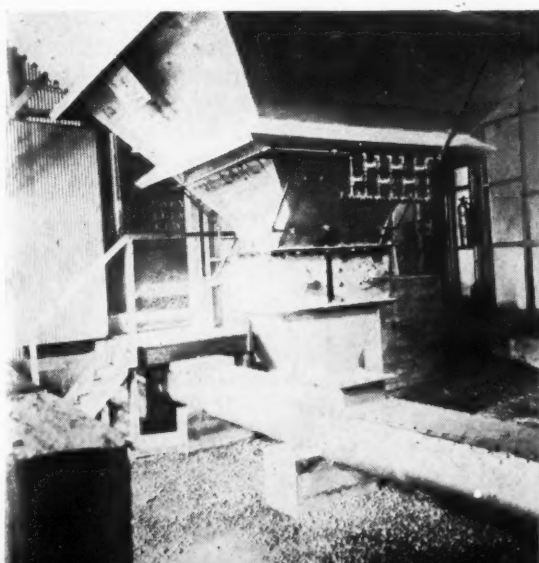
ing unit, the supplier was able to meet all requirements for the first stage of the project from this plant.

Plant No. 1 batched 80 percent of the concrete furnished under the contract. Location of the plant proved ideal, as the

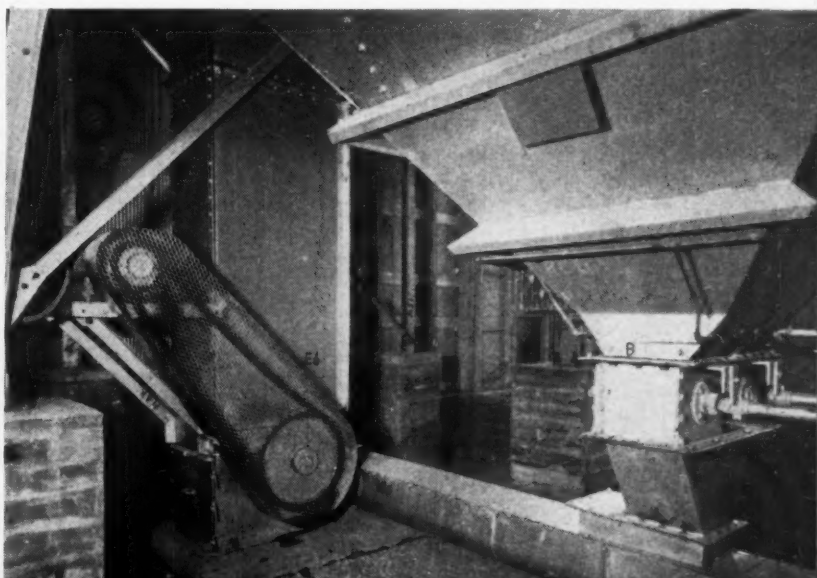
average haul for concrete deliveries was only about 2 mi., over the excellent construction roads previously mentioned. Not a single broken axle was suffered during the job.

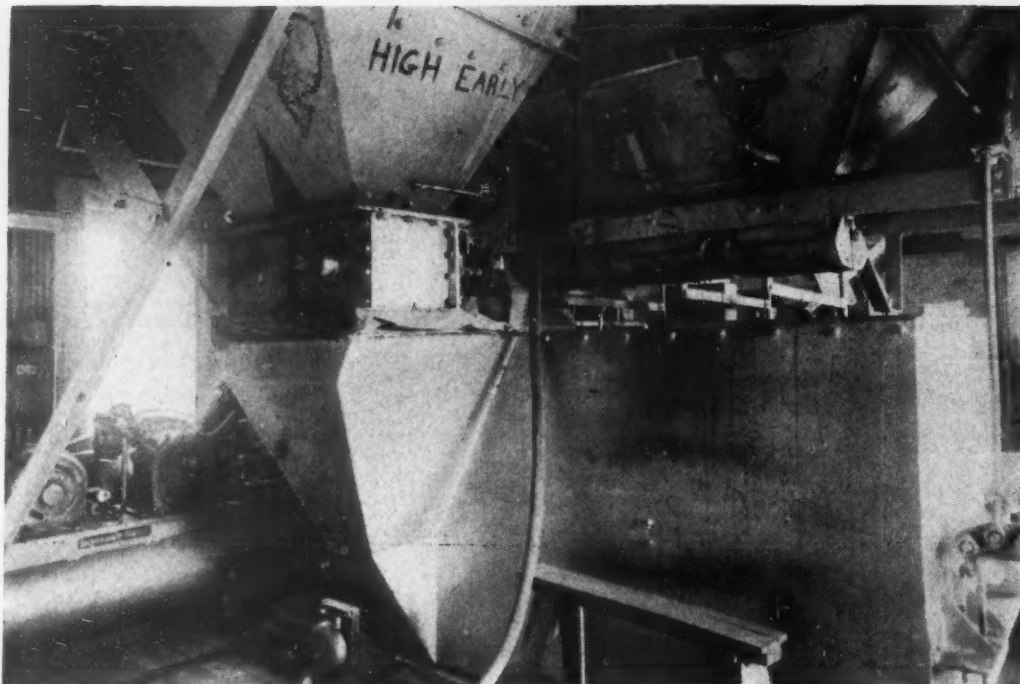
Equipment at Plant No. 1 consisted of

a Butler 150-cu. yd. three-compartment aggregate bin, a 1,200-bbl. two-compartment ground storage cement bin, a 200-bbl. two-compartment auxiliary overhead cement bin, a 12-in. track-unloading screw conveyor and a 350-bbl.-



FROM BENEATH TRACK at similar plant installation, 12-in. screw conveyor in cement-tight housing (left) delivers bulk cement to bucket elevator (right) which raises material to overhead hopper. Mounted above screw conveyor is cement storage bin to which overflow returns from upper cement hopper. Bin is equipped with rotary valves and air jets to assist discharge of cement into screw conveyor.





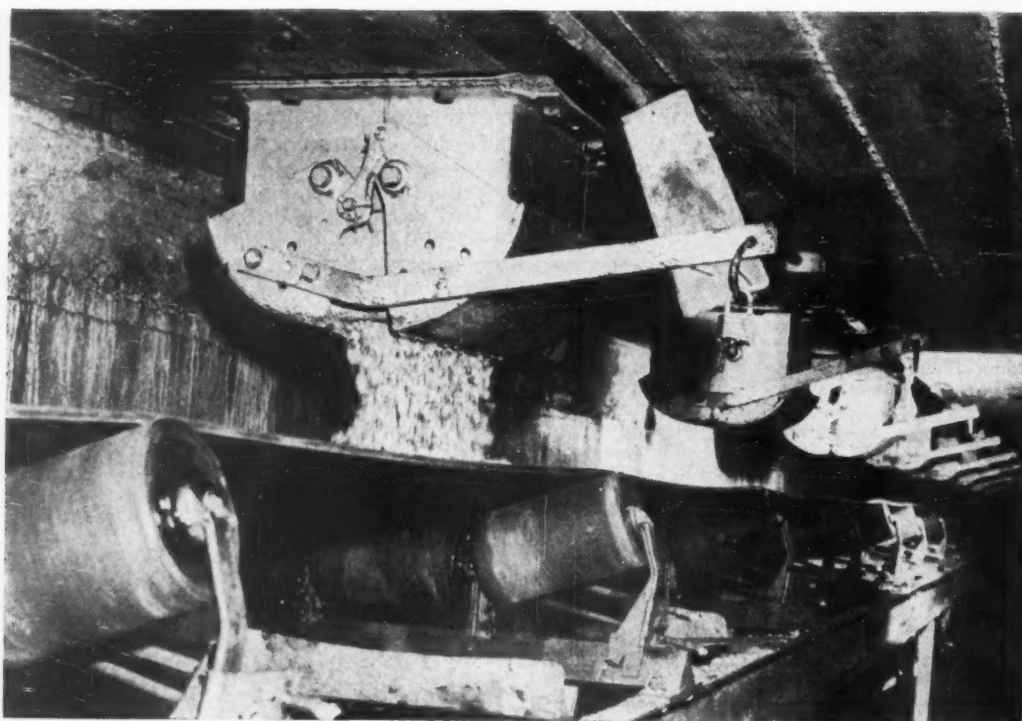
TWO TYPES OF CEMENT can be handled out of two-compartment overhead hopper to weigh batcher at plant duplicating features of Clinton Engineer Works' set-up. Air jets and electric vibrators operating simultaneously are needed at latter installation to move hot cement used during part of job. Steam jets in sand and stone bins heat aggregates in cold weather.



TRUCK MIXER of 5-cu. yd. capacity on diesel-powered truck is typical of units employed by concrete contractor at Clinton Engineer Works. This model has shaft drive and tandem rear end.



SECOND TYPE of diesel-powered truck mounting 5-cu. yd. mixer for concrete delivery at Clinton Engineer Works has chain drive to single rear end.



necessary to use jets of low-pressure air and electric vibrators simultaneously on the auxiliary cement bin to prevent arching of the cement and assure continuous flow through the gates over the batcher when weighing cement.

To assure ample water at adequate pressure, a special line was installed from a reservoir for the exclusive use of Plant No. 1. Water was furnished at a constant pressure of 60 psi. at the batch floor. This steady pressure facilitated operation of the automatic water weigh tank. The discharge from the weigh tank to the mixer truck was 4-in.-dia. pipe.

A 30-in. inclined belt conveyor having a capacity of 375 cu. yd. per hr. supplied

(Continued on page 152)

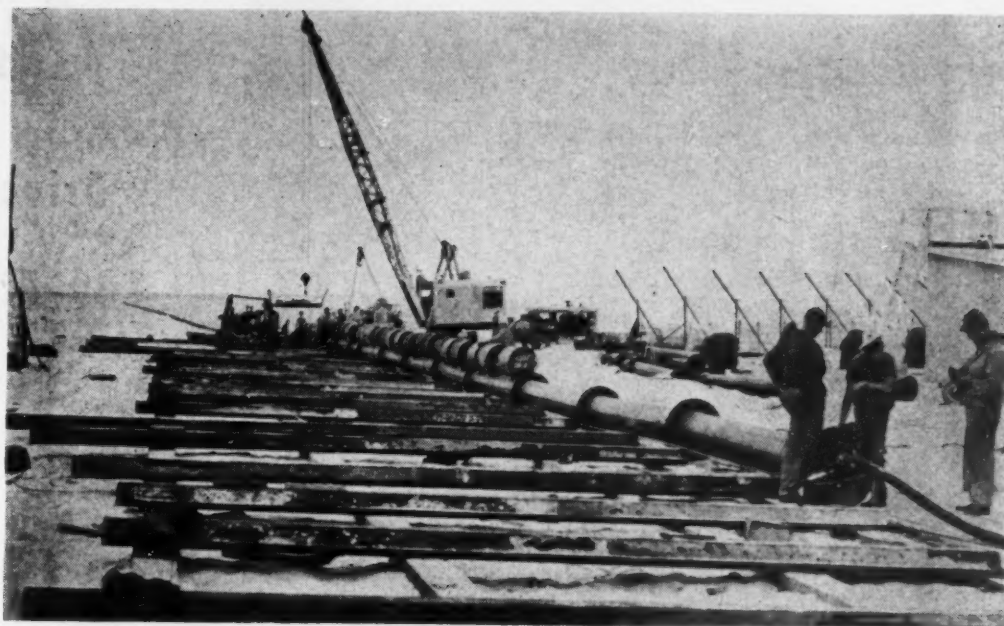


FEEDER BELT in reinforced-concrete tunnel under stockpiles receives aggregates in regulated amount through hand-operated 18x18-in. gates, installed six in row on 8-ft. centers, much as in this tunnel at another plant.

2,000-Ft. Outfall Sewer PLACED IN 12 HOURS

AS A LAST MINUTE JOB on Midway, the Navy's Seabees ran 2,000 ft. of 16-in.-dia. cast-iron, ball-and-socket pipe into the surf to serve as an outfall sewer. The pipe was assembled on shore in 250-ft. lengths, and when weather conditions permitted, was run into the surf, connected, and sunk in a period of 12 hr.

Because of coral reefs and the prevalence of storms, this method was the only feasible means of placing the pipe during the winter season. The method used is illustrated in the accompanying photographs. The procedure is considered highly successful, as the new sewer is now giving satisfactory service



↑
MADE UP ASHORE in sections 250 ft. long, 16-in.-dia. cast-iron pipe is ready for launching into surf to serve as 2,000-ft. outfall sewer.

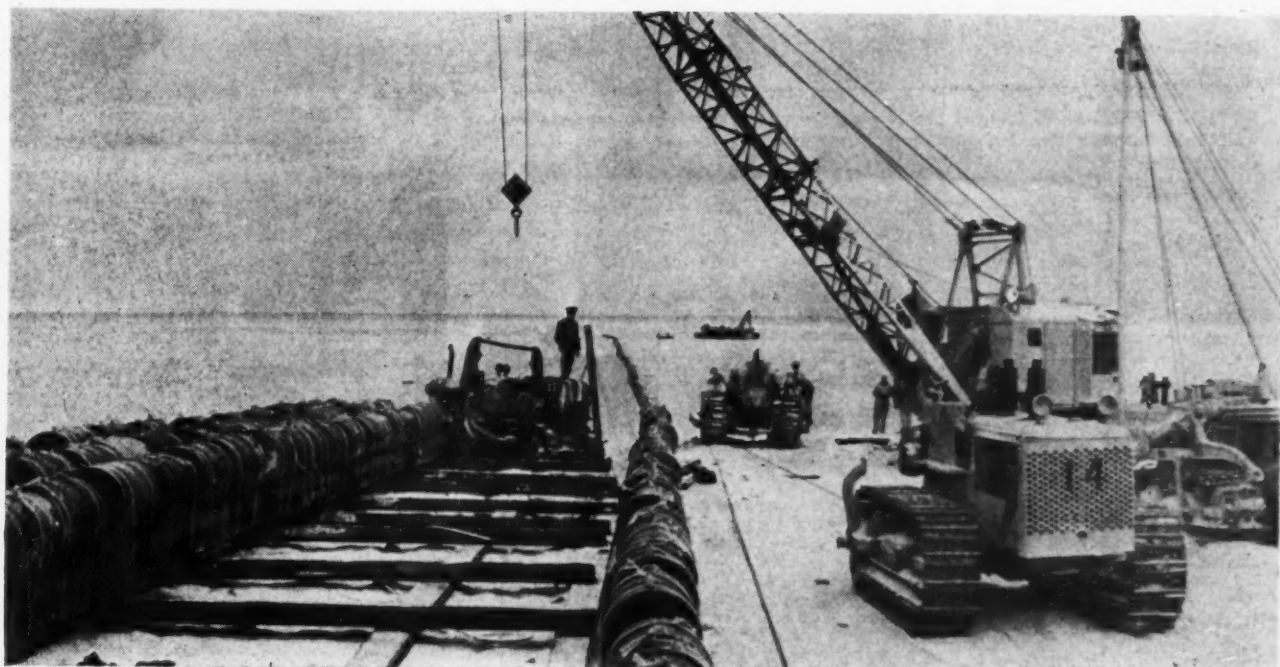


→
METAL DRUMS are lashed to top of jointed section of pipeline to aid in floating it to place prior to sinking.



↑
COMPRESSED AIR is admitted to inboard end of pipeline to disclose leakage at joints and prevent premature sinking while being floated to place.

→
EQUIPMENT FOR LAUNCHING pipeline includes tractors and crawler cranes.



Horizontal Pile Hammer

**Drives Heavy Steel Tierods
100 Ft. Through Shipyard Fill
In Unique Repair Job**



1 NEW BULKHEAD of Bethlehem Z-type interlocking steel sheetpiling is driven on line 2½ ft. behind old timber sheeting which had started to fail.



CONSTRUCTION PERSONNEL includes (left to right): JOSEPH S. MYERS, plant engineer, N. Y. Yards, for Bethlehem Steel Co.; and EDWARD G. CAREY, chief engineer, and JAMES HASTINGS, general superintendent, for George W. Rogers Construction Corp.

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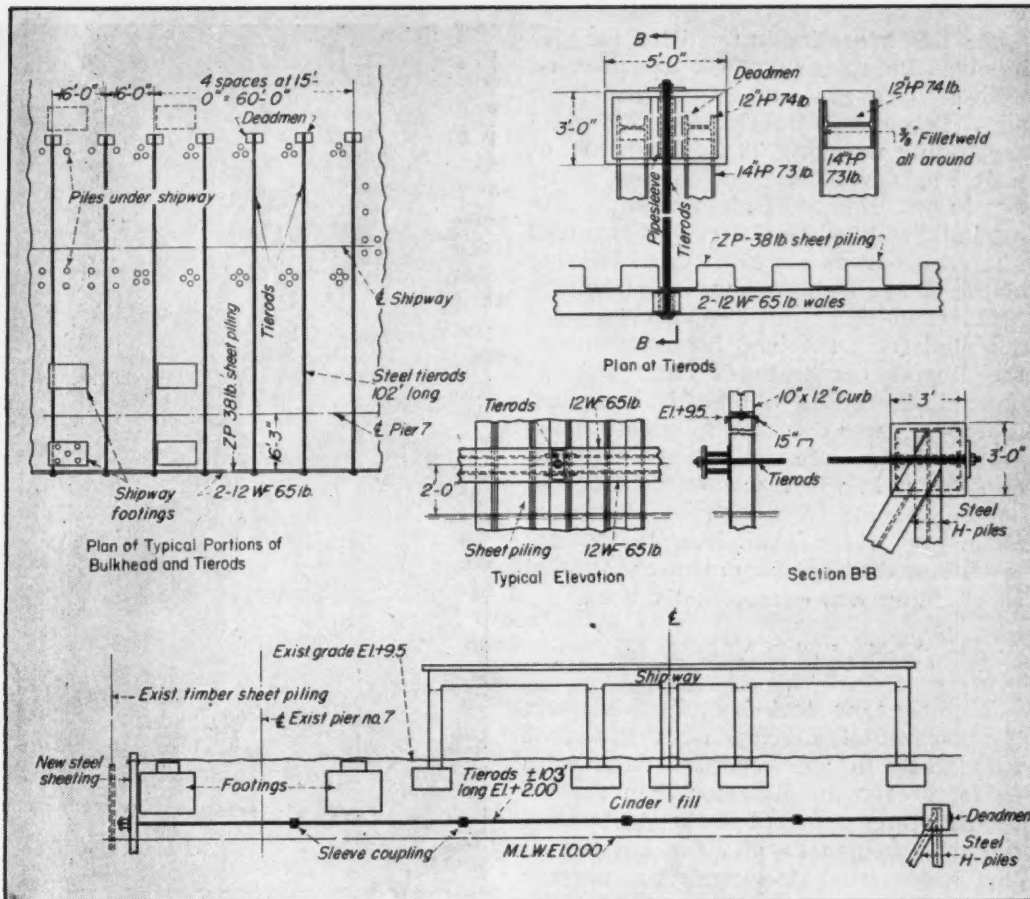
3 PILEDRIVER LEADS (below) are lowered to place in hanging cradle after planks forming working platforms have previously been set on timber sills of cradle.



2 TIMBER CRADLE to support piledriver leads and working platform is picked up by boom of derrick boat and is being lowered to hang, at left end, from top of new sheetpile bulkhead and, at right end, from timber caps on line of piles.

4 PILE HAMMER (below) descends between timbers of cradle for placement in horizontal position in leads.





DETAILS OF STEEL TIERODS, new steel sheetpile bulkhead and H-pile deadmen to which rods are anchored for retaining cinder fill supporting shipbuilding ways. Rods 3½ and 3¼ in. dia. are driven horizontally through fill by pile hammer. Each string of five rods, joined by sleeve couplings, is 103 ft. long.



5 FIRST STEEL TIEROD of 3½-in. dia. is positioned in leads for horizontal driving by steam pile hammer.

BY DEVISING SPECIAL RIGGING and methods for operating a steam pile hammer in a horizontal position to drive heavy 3½-in. dia. steel tierods distances of more than 100 ft. through a cinder fill constituting Pier 7 at the shipyard of Bethlehem Steel Company on Staten Island, the George W. Rogers Construction Corp., New York City, completed a difficult and unusual waterfront repair operation. This work was a lump-sum contract awarded the Rogers corporation by

Bethlehem after receiving competitive bids.

The site consisted of an earth and cinder-filled pier, No. 7, about 30 ft. wide; a shipway sloping to below low water; then another earth filled pier, No. 6. An old timber bulkhead, built during World War I, retaining the earth fill of Pier 7, which, in turn, retained the shipway, was in very poor condition and badly needed replacement.

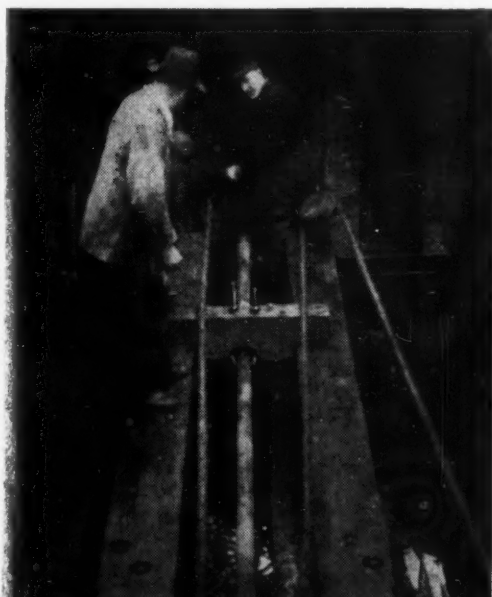
Repair Plan—Pier 7

The plan developed for repairing Pier 7 consisted essentially of holding the cinder fill in place by replacing the old timber bulkhead with a line of new steel sheetpiling and trying the new facing at intervals of 15 ft. to deadmen in the form of H-piles located more than 100 ft. back from the bulkhead. This long length of tierods was necessitated by inability to find a space to construct the anchor deadmen without interfering with the construction of the ship on the shipway, which, of course, could not be allowed. The same limitation also dictated the driving of the tierods, rather than the usual method of excavating a trench and placing them in it.

The ties consisted of heavy steel rods 3¼ and 3½ in. dia. in lengths of 19 and 21 ft., threaded at the ends, and, as driving through the fill proceeded, coupled successively by sleeves into continuous strings 103 ft. long. It was necessary to

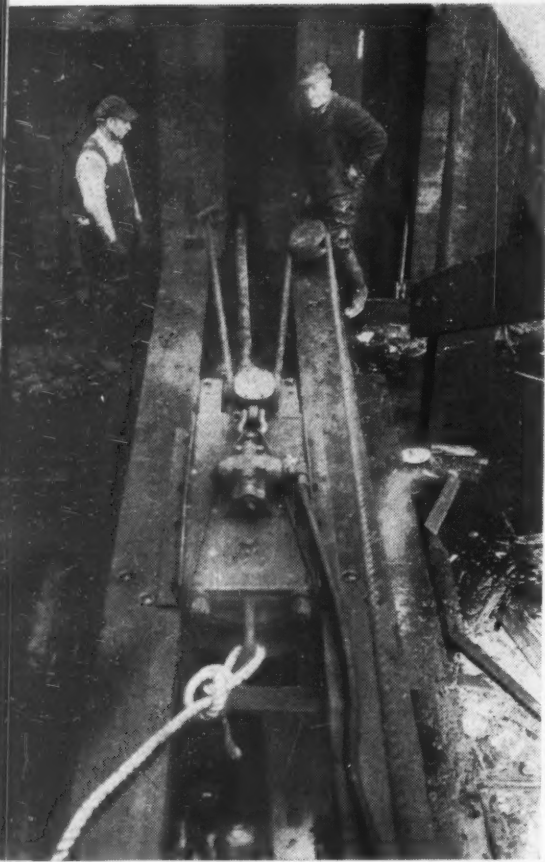
drive the rods in five sections because of restricted space available in the slip alongside Pier 7. These rods weighed 28 lb. per lin. ft., or a total of 3,000 lb. or more per rod with couplings attached. The project required a total of 26 strings of rods. These tierods had to be driven from the bulkhead line horizontally through the fill at an elevation of 2 ft. above mean low water. As the tidal range at the site is 5 ft., work had to be carefully scheduled to proceed intermittently

6 SLIDING YOKE (below) between pile hammer and face of bulkhead supports steel tierod by means of a pair of adjustable hook bolts extending vertically through cap.



7 PILE HAMMER (below) rigged in horizontal leads has driven portion of length of steel tierod through bulkhead and into cinder fill. Hammer, supported on leads by angle-irons at each side, is pulled forward by cable passing through tackle blocks to niggerhead on derrick boat.





8 AS HAMMER ADVANCES sliding yoke supporting tierod is removed to permit hammer to work in close to face of bulkhead.

during the periods when the pile hammer for driving the tierods would not be under water.

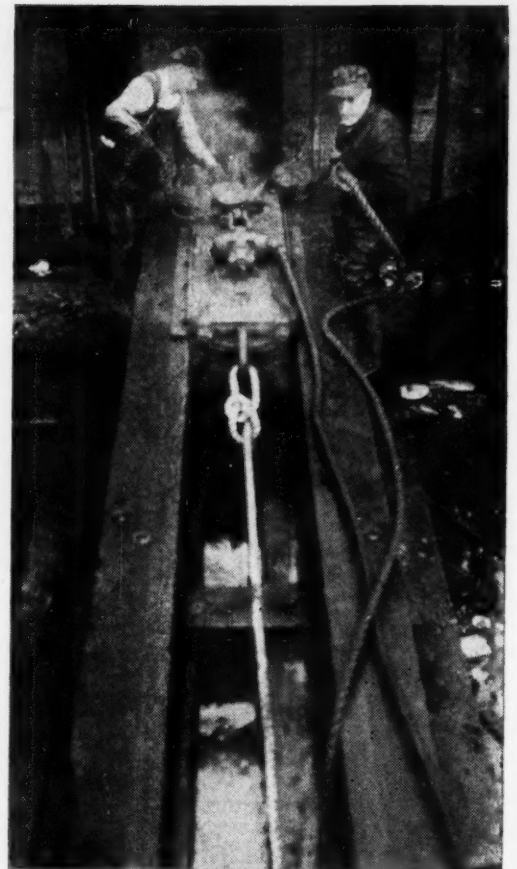
Numerous tests had been made by Bethlehem representatives to make sure that any acidity due to the cinder fill had disappeared and that the tierods would not be attacked.

The first operation in repairing the pier involved the removal of the old, decayed timber bulkhead and its replacement with Bethlehem interlocking ZP steel sheetpiling weighing 38 lb. per sq. ft. of wall. The new steel sheetpiling was first driven on a line 2½ ft. behind the existing bulkhead and the latter was removed after the tierods were in place. Driving of the steel sheetpiling was done with a McKiernan-Terry 9B-3 steam hammer operated from the long boom of one of the Rogers corporation's derrick boats moored along the bulkhead. The steel sheetpiling was driven through silt, clay, sand and gravel to a penetration of 2 ft. into the rock, which was encountered at depths varying from 30 to 40 ft. below mean low water level. Despite the site conditions the final alignment of the steel sheet piling was exceptionally good.

Method of Driving Rods

With the new steel sheetpiling in place, the horizontal driving of the tierods through the fill was begun. Circular holes ½ in. greater in diameter than that of the couplings were cut in the steel sheetpiling 15 ft. apart and 2 ft. above mean low water level, to permit the passage of the rods through the new bulkhead. Then, timber leads to support the pile hammer in a horizontal position were set to proper line and grade. These leads consisted of two main 8x10-in. timbers placed just far enough apart to allow the pile hammer to slide horizontally between them. Angle irons were bolted to each side of the hammer to support it in the leads and allow it to slide forward as the tierods were driven.

Originally it had been planned to support the pile-hammer leads on two rows of new piles driven parallel to the face of the bulkhead. This scheme was superseded by hanging the leads in a timber cradle supported at the inshore end of the tops of the steel Z-piles forming the new bulkhead and at the other end by



9 A 21-FT. LENGTH OF TIEROD has been driven home and workers are detaching pulling cable from forward end of steam hammer so that hammer can be hauled back to end of leads by rope in foreground to start driving next length of tierod.

a line of timber caps on a row of wood piles, as shown in one of the photographs. The plan adopted required the driving of only one, instead of two, rows of piles to support the piledriver leads and when one string of tierods had been driven it was a matter of only a few minutes for the derrick boat to pick up the cradle and swing it over to a new setup for driving the next tierod.

After the cradle had been set in posi-



10 NEW LENGTH of steel rod (left) is being joined by screwed sleeve coupling to protruding end of section already driven through bulkhead into fill. Sliding yoke supports mid-section of tierod in piledriver leads.

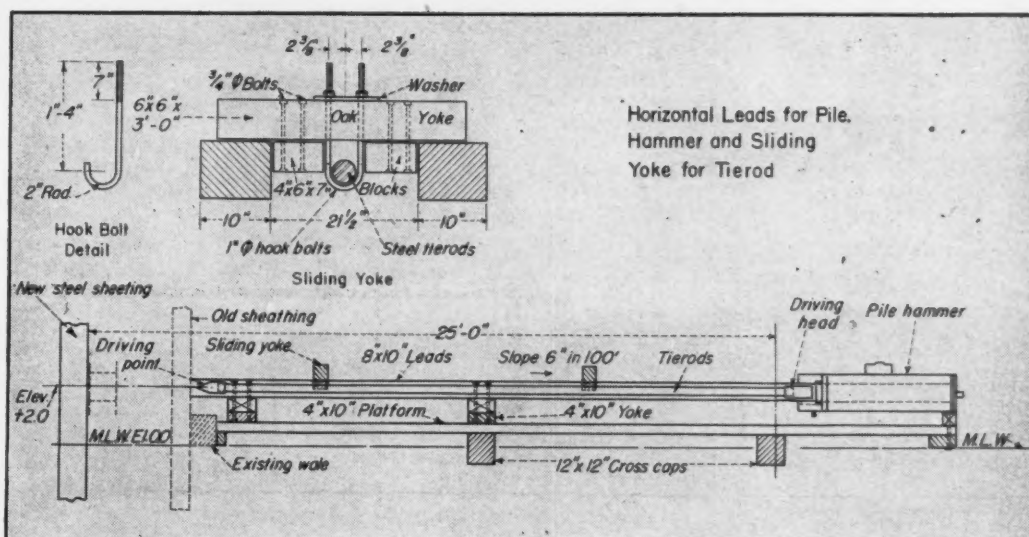
11 STEEL TIERODS (right) in lengths of 19 and 21 ft., ready for driving, are here shown with sleeve couplings on ends. At left, first rod of string has stabilizing fin welded to top to guide travel along horizontal path and prevent dipping downward.



tion the derrick boat first lowered on to the two cross-beams or sills of the hanging cradle a pair of built-up platforms or runways of 4x10-in. planks to support the workers handling the pile hammer and tierods. Next, the piledriver leads were set in place by the derrick boat, accurately aligned and blocked up to proper elevation for driving the tierods through the hole in the new steel sheet-piling bulkhead. Finally the pile hammer, a McKiernan-Terry No. 7 steam-operated unit weighing about 5,000 lb., was lowered into horizontal position in the leads. After these operations had been completed, the stage was set for the driving of the first length of tierod horizontally through the cinder fill supporting the shipbuilding ways.

With the pile hammer and leads in place the derrick boat picked up the first length of tierod and lowered it into the leads. Here it was fitted into a driving cap on the hammer and supported midway of its length by hook bolts in a yoke which slid on the 8x10-in. timbers of the leads. This yoke, as illustrated, consisted of a 6x6-in. oak cap 3 ft. long through which extended vertically a pair of hook bolts spaced 4 3/4 in. apart and threaded on their upper ends to receive nuts which were turned so as to provide the necessary accurate vertical adjustment for supporting the tierod at the proper elevation for driving and preventing any sag at the middle of the rod.

When the first rod had been accurately set in the leads the pile hammer started to work, driving the rod through the hole in the bulkhead and into the cinder fill behind it. As driving progressed the hammer was pulled forward in its leads by a manila rope cable made fast to an



HORIZONTAL LEADS, which are hung in wood cradle, carry pile hammer for driving steel tierods, coupled into 103-ft. strings, through fill behind new sheetpile bulkhead. Sliding yoke with adjustable hook-bolts supports rod at midpoint to prevent sag. Conical driving point first used was superseded by welding horizontal stabilizing fin, 6 in. wide and 3 ft. long, to top of first rod to prevent it from dipping from horizontal path during driving.

eye-bolt on the face of the bulkhead and reeved through two tackle blocks, one attached to the bulkhead and the other to the pile hammer, and thence to a niggerhead on the derrick boat, thus producing a 3-part line for pulling the pile hammer. When the first rod had been driven so that only a few inches of it threaded and protruded from the bulkhead face, the pile hammer was pulled back to the far end of the leads and a new length of tierod lowered into place and joined to the first length by a screw coupling or sleeve. The driving operation was then repeated until the five lengths

of rod in each string were pushed through the fill.

To protect the threaded end of each rod from damage by direct blows from the pile hammer a driving head, in the form of a 3-ft. length of rod, was attached by a sleeve coupling to the driven end of each length of tierod to receive the impact of the hammer. When each length had been driven, this driving head was unscrewed and removed to enable the next section of rod to be coupled to the one extending into the fill.

Each new length of rod was screwed (Continued on page 124)



12 DRIVING HEAD (left) is attached to end of rod to take impact of pile hammer blows and protect threaded end of rod. Coupling is made with aid of stillson and chain wrenches.

13 NEARLY COMPLETED PORTION (right) of bulkhead shows protruding end of tierod, with nut attached, prior to installation of pair of wide flange steel beam wales at elevation of tierods.





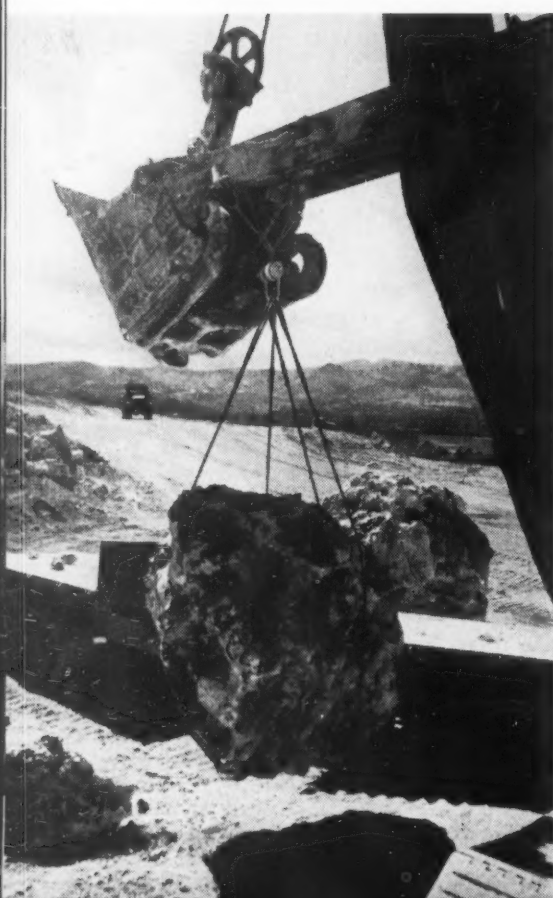
ARMOR STONE IS DUMPED on seaward side of breakwater from Athey wagons. Stone in this picture, just about to be dumped, weighs 13½ tons.

SEABEES BUILD

Breakwater at Guam

By R. P. DAY, CCM, USNR

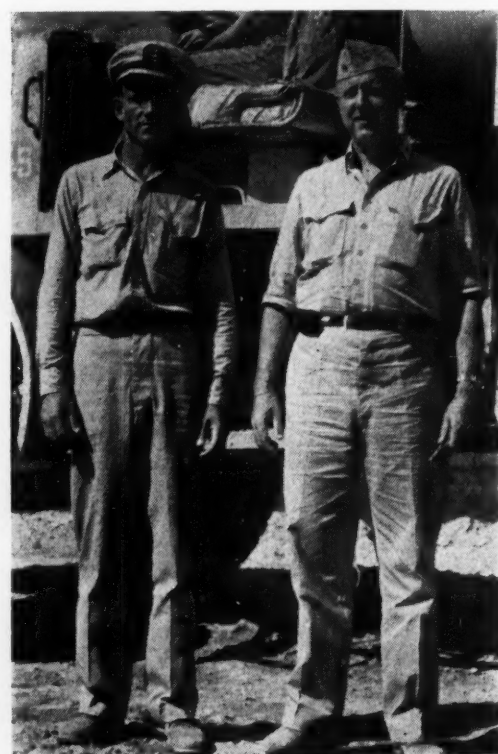
TWO OF FIELD MEN (below) on this job are Lieut. W. C. WING (right), project officer of naval construction battalion doing work, and Chief Carpenter JAMES HARRIS, assistant project officer.



LARGEST EARTH-MOVING EQUIPMENT assembled west of Hawaii is being used by naval construction battalions to push Guam's Port Apra breakwater toward completion. The massive barrier, begun in 1941 by Pacific Naval Air Base Contractors, was scheduled for completion 450 working days from Mar. 1, 1942.

On Dec. 8, 1941, all work stopped when Japanese troops swarmed ashore on Guam, capturing civilians and the few garrison troops. These men were all shipped away to face the horror of Japanese prison camps. When the Seabees reached Guam on July 25, 1944, they found the job substantially as the contractors had left it 3 years before. PNAB crews had finished about 5,000 ft. of the

WIRE ROPE SLINGS which can be quickly attached to connections welded to dipper stick enable power shovels to handle heavy rock. Making every shovel in quarry able to handle heavy stone eliminates need to move special equipment each time large pieces have to be loaded.



approach causeway across shallow Luminiao Reef which lies between the quarry at the shore end of the breakwater and exposed water 30 ft. deep on Calalan Bank, where the protection of the breakwater was most needed.

Heavy hauling equipment delivered to PNAB had been stolen by the Japanese. Several old rusty shovels yielded some spare parts, and four Euclid end-dump trucks, thought by the Japs to be worthless, were overhauled and made to run again by expert Seabee repair crews.

For the most part, however, special excavating, drilling and hauling units considerably heavier than construction battalions normally used had to be brought in especially for this job. They included a Bucyrus-Erie 120-B electric 5-cu.yd. shovel, with its power plant, which is believed to be the biggest shovel now in use by engineers of the armed forces in the Pacific.

Breakwater Construction

Port Apra breakwater is designed to stop the ground swells, and to shelter vessels at anchor in the outer harbor. A grand total of nearly two million cubic yards of rubble mound is to be put together to form the massive structure. It will extend about 3 mi. from Cabras Island over Luminiao Reef and along Calalan Bank toward the north harbor entrance. The Seabees will build some 10,000 lin. ft. of this and will also do considerable raising and widening of the approach section built in 1941 by the PNAB forces.

The breakwater will reach a height of about 25 ft. above mean tide on Calalan Bank. Its side slopes will fall roughly



STONE WEIGHING 20 TO 30 TONS is used for armor on more exposed sections. Northwest 80-D crane loads Athey trailers.

1½:1. A quarry-run core will be protected by 10- to 30-ton armor stones covering both sides and the top.

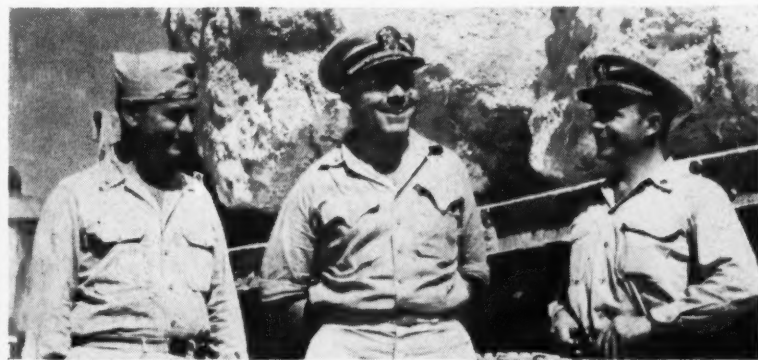
The breakwater is being built in two stages, to take advantage of a spacious working top at the lower level. First stage construction includes the building of the core section, and the dumping of

armor stone on the seaward side. This Seabee procedure differs from that originally planned by PNAB contractors who had proposed to complete the breakwater as they went along.

Stone for the structure is being quarried by Seabees and a few Army Engineers at nearby Cabras Island, where a quarry 1.1 mi. long has been opened up. Here, for several hundred feet, a 50-ft. face has been developed. This is about the maximum height possible because of the topography. Both churn and wagon

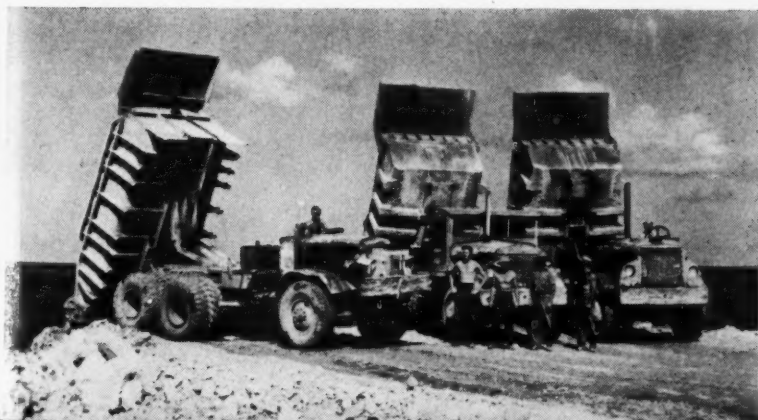
Page 87

LOOKING FROM INSHORE END along fill across Luminiao Reef, deep water of Calalan Bank is seen in background.



ARRIVAL OF HEAVY EQUIPMENT for job may account for good nature shown here by, left to right, Comdr. E. B. CAVALLO, regimental officer in charge; Comdr. F. L. ENDEBROCK, battalion officer in charge; and Lieut. Comdr. J. S. GLUNT, regimental executive officer.

FOR DELIVERY on end of advancing fill (below) trucks back into position to dump loads of stone.





LOADING AT QUARRY FACE. Northwest 80-D shovels serve Mack and Euclid dump trucks. Caterpillar D-8 cleans up.



TURNOUTS FOR TRUCKS are built every 300 ft. to facilitate turning in early stages of work, while top is narrow.

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SUNKEN CONCRETE BARGES (below) would have been embedded in breakwater if typhoon had not moved them aside before fill progressed that far. Barges appear in foreground both left and right. Depth here is 30 ft.



drills are being used to good advantage. Churn drill performance has averaged 50 lin.ft. of 6-in. hole in 16 hr. This includes time necessary for moving, setting up and levelling the rig.

Blasting the limestone has proved to be more difficult than was anticipated. The average explosive ratio thus far has been 1½ to 2 lb. of 40 percent powder per loose cubic yard produced. This figure, higher than most states-side blasting averages, is probably caused by seismic seams which pass through the Cabras Island rock in every direction. The Seabees got best results from 6-in. holes drilled on 17-ft. centers, sprung with 50 lb. of 60 percent granular dynamite, resprung with 150 lb. of the same material, and loaded with 1,400 lb. of 40 percent granular dynamite.

Because there are a number of military installations nearby, the charges have to be kept low, with at least 18 to 19 ft. of stemming on top of each charge. For detonation No. 6 electric blasting caps are set inside a two-stick package of 60 percent gelatin. Granular dynamite, which fills up seams, does better here than stick gelatin.

Heavy Equipment Needed

The real Seabee problems on the Port Apra breakwater job have been getting equipment heavy enough to meet requirements. So heavy and destructive to machinery is this kind of work that seldom is all the equipment available. Additional shovels, trucks, rubber mounted trailers, compressors and drills have been ordered. If they arrive in time perhaps the Seabee estimate of 1945 completion will not be too optimistic. In seven months the Seabees completed about 30 percent of the work, but it is expected that this rate of progress will accelerate.

As this was written the Seabees have the equipment listed as assigned to the job. This list, of course, represents maximum equipment available. There have been many days when only two shovels and less than a dozen trucks could be used, because others were in the shop or had been diverted to other urgent work nearby.

The best method the Seabees have found for handling the big armor rock has been with Northwest 80-D shovels

(Continued on page 176)

Arc-Welded Building Requires 22 Percent Less Steel

By R. A. GAST

Mechanical Engineer, The Lincoln Electric Co., Cleveland, Ohio

OVERHEAD COSTS FOR STEEL FRAME BUILDINGS fabricated by electric welding are remarkably low because such fabrication requires no layouts, no complicated detailing, no punching of rivet holes and no handling of auxiliary connecting members. Because of the simplicity of welded design the resulting structure is a strong, rigid framework with large areas free from the cross-bracing required in conventional construction.

These attributes of welded design are exemplified by the welded construction of a new commercial building for the Ohio Builders Specialty Co., Cleveland, Ohio. This 75-ft. 8-in. by 142-ft. one-story building with interior steel frame and cement block bearing walls provides free areas of 500 sq.ft. with an average vertical clearance of 14½ ft. By using steel roof deck weighing 4.5 lb. per sq.ft. the amount of material used was 22 percent less than would have been required by simple steel spans of riveted design.

Unusual Type of Roof—Roof panels measuring 2 ft. by 8 ft. 6 in., composed of prefabricated, 20-gage black baked enamel, were crimped and spliced for adequate weatherproofing, and plug welded direct to the purlins. This feature signifies the



BASE PLATE IS FILLET WELDED to bottom of 8-in. wide flange, 24-lb. column and anchored by bolting to concrete block footing. Base plate and plinth, or top plate, are designed to absorb stresses developed by wind pressure on building and side thrust stresses produced by overhead cranes.

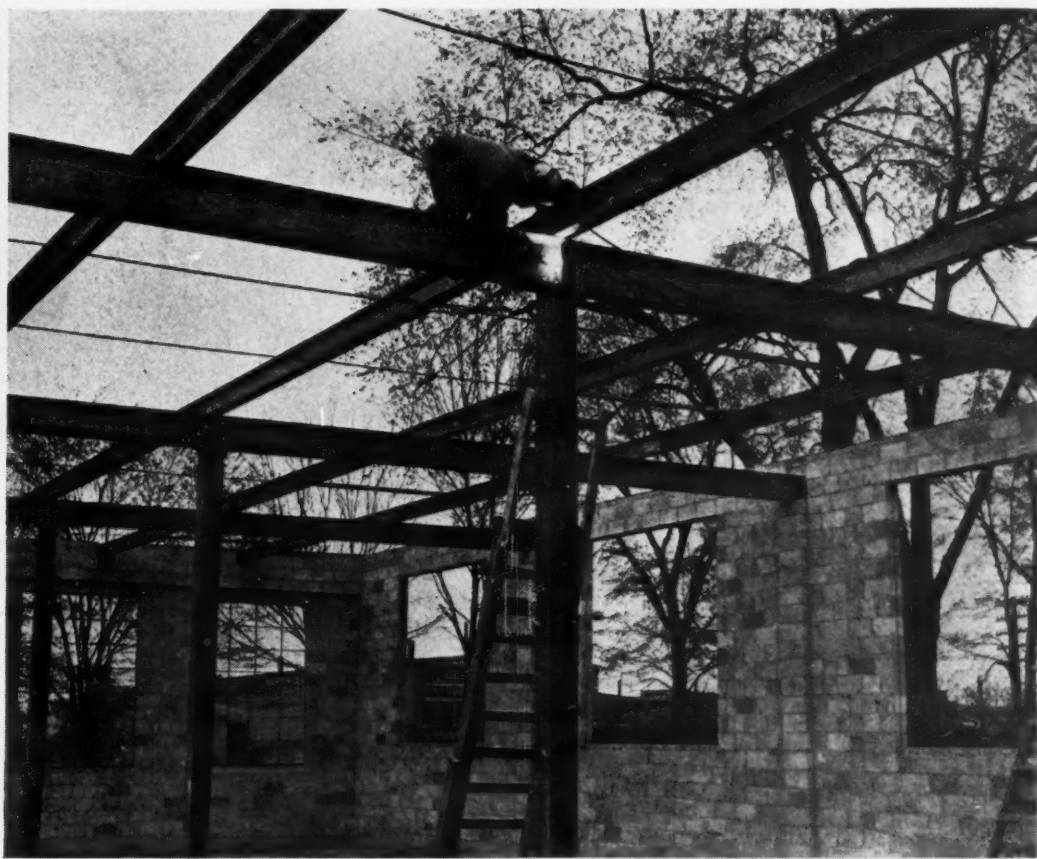
flexibility of the welding process for meeting practically any structural requirement.

To effect rapid fusion in plug welding of panels the operator first breaks the enamel in the spot to be welded by striking it with a ball-peen hammer. He then fuses the roofing panel to the purlin using a 5/32-in., shielded arc electrode for mild steel, with the welder set at 250 amp. On the Cleveland job

(Continued on page 150)



PLUG WELDS EFFECT RAPID FUSION of enameled roof panels to purlins. Entire roof structure of 75-ft. 8-in. by 142-ft. building is completed by three operators in 14 hr.

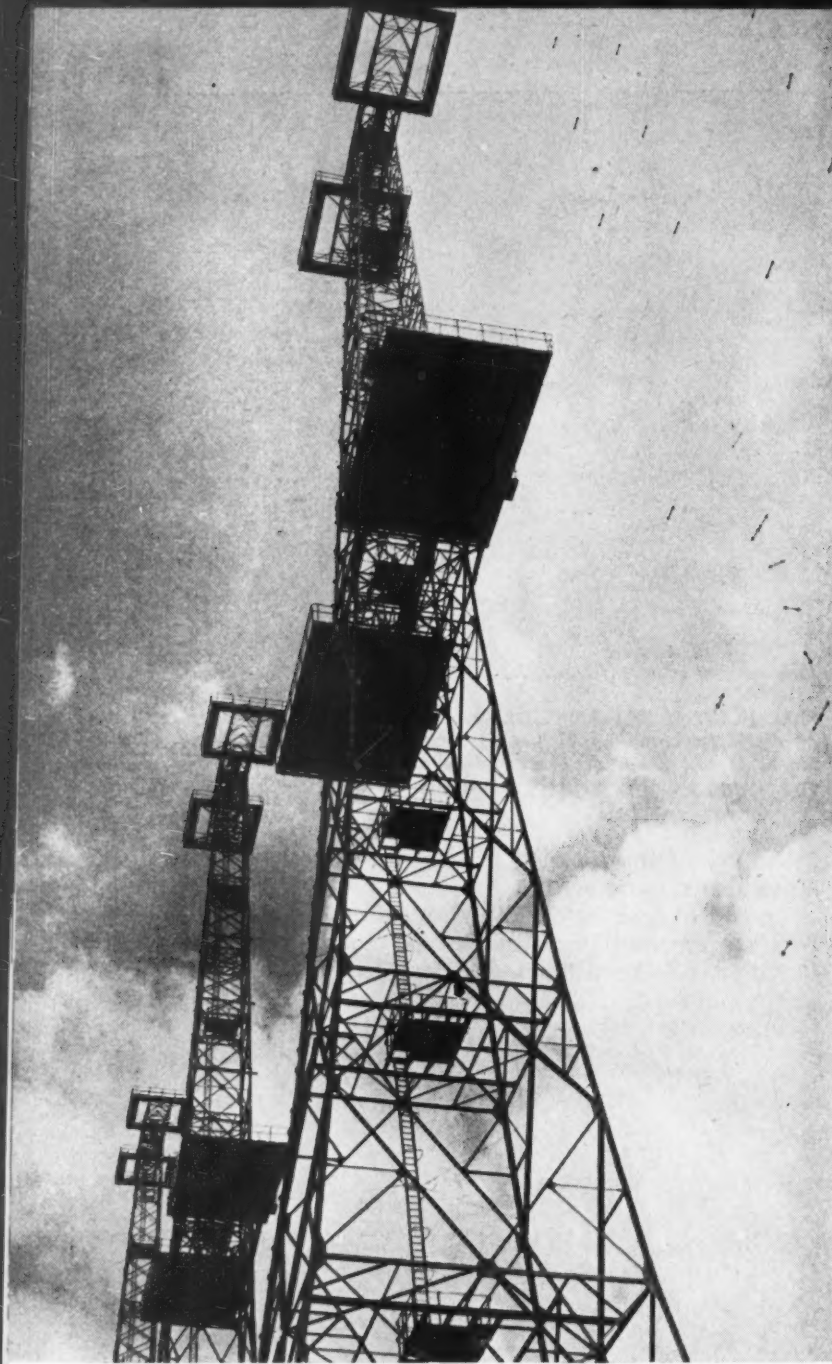


ARC-WELDED SPlice CONNECTIONS centered over columns give effect of continuous beam full width of building. Plates ¼ in. thick welded to bottom flange of beam ends serve as bearing surface on cement block wall columns.

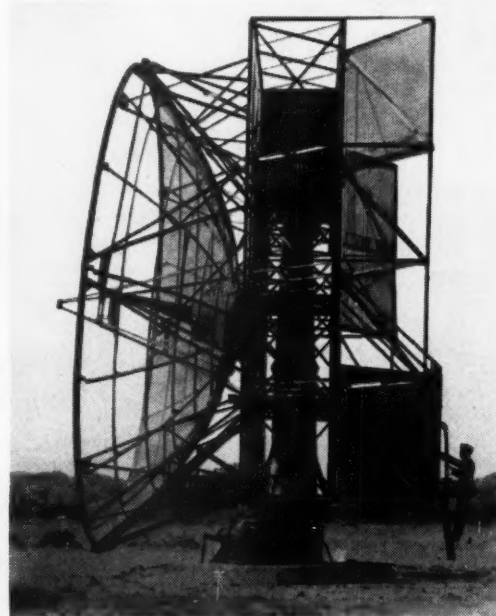
Radar Stations

Use Tall Steel Towers To Guard Britain's Coast

THE VITAL ROLE which radar played in checking bombing attacks by Germany's air forces during the crucial Battle of Britain, a subject of top military secrecy while the war lasted, has just been disclosed by the British Information Services, official government agency. Interception, by radar, of incoming enemy bombers before they reached London or other English cities, involved construction by the British Air Ministry of a chain of high-power detecting stations to provide a protective curtain covering the whole east and south coasts of England from Scotland to the Isle of Wight. By March, 1940 an expenditure of \$36,000,000 had been authorized for the radio-location defense system. The project involved the construction of steel towers 360 ft. high for both offensive and defensive operations, and other devices, both stationary and portable, some of which are illustrated in the accompanying photographs.

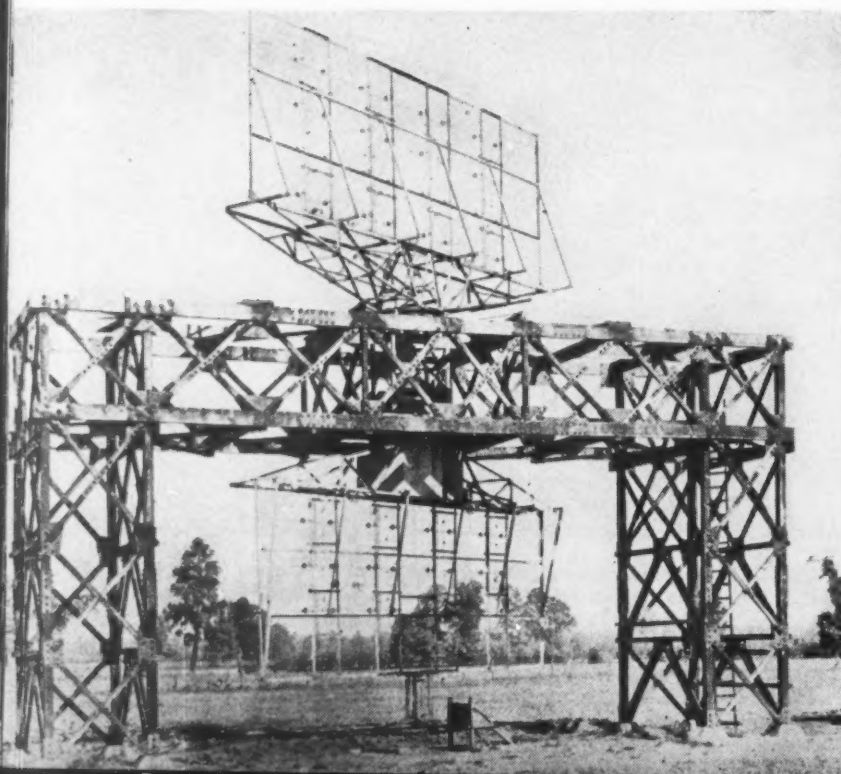


STEEL-FRAME TRANSMITTING TOWERS 360 ft. high form chain of home radio direction finder stations on Britain's east coast. On west coast, different type of guyed mast 325 ft. tall is used.



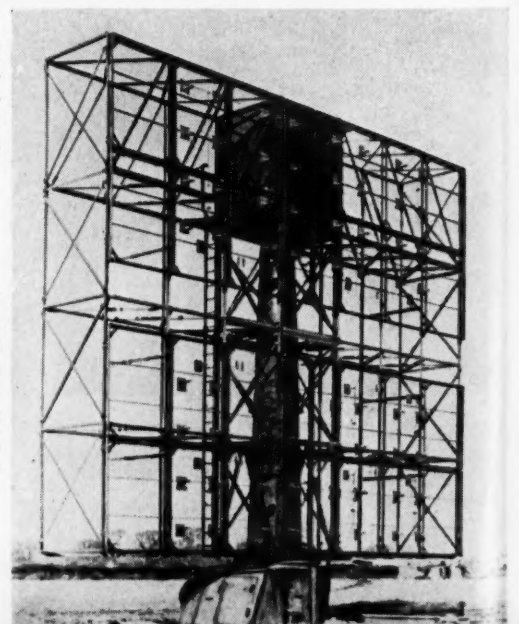
← FOR OFFENSIVE OPERATIONS, fighter direction aerial system comprises ground-controlled interception structure and rotation gear on which is mounted 35-ft.-dia. paraboloid.

British Official
Photos



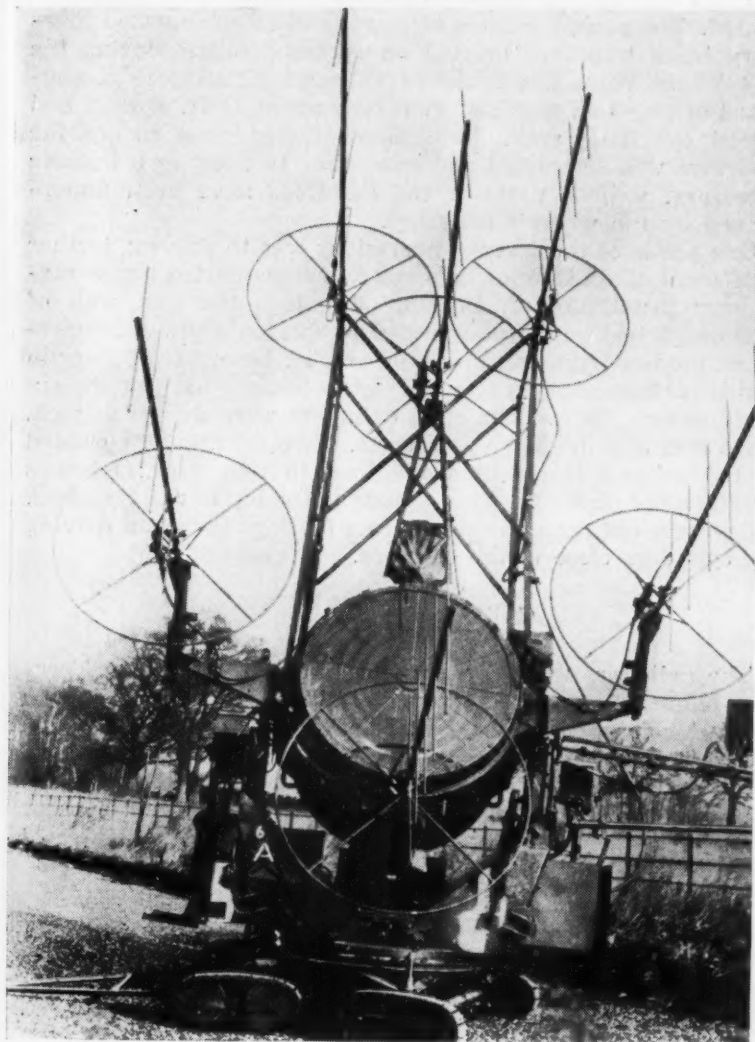
← MOUNTED ON TIMBER GANTRY is this ground-controlled radar interception station designed for speedy erection and transport to new location as needed.

→ GROUND-CONTROLLED INTERCEPTION STATION enables fighter planes under its direction to intercept enemy planes after they have been detected by radar reporting chain of stations.



RADAR-CONTROLLED SEARCH-LIGHT, mounted on crawler treads, was of great assistance to British Army anti-aircraft gunners and to R.A.F. fighters in shooting down enemy's night bombers. Radar enabled searchlight to aim itself and follow a moving target automatically.

TOWER ON COAST OF BRITAIN, 185 ft. high, is equipped for detection of low-flying airplanes. Aerial equipment consists of power-rotated, five-bay, four-stacked arrays, or electrical components of system.



"Construction Methods" Wins Fourth Editorial Award

EDITORIAL AWARD to "CONSTRUCTION METHODS" is made by magazine "Industrial Marketing" in its Eighth Annual Competition for Editorial Achievement by business publications in the United States and Canada. ROBERT K. TOMLIN, editor, receives engraved plaque representing "First Award for best use of illustrative treatment of editorial material during the twelve months ending July 31, 1945." Presentation was made Sept. 10 at dinner meeting in New York of National Industrial Advertisers Association by D. Clinton Grove, of Blaw-Knox Co., who represented seven-man jury which reviewed 419 entries by 150 business magazines.

This is the fourth award that "Construction Methods" has won in this competition; the others were: 1944, First Award for greatest improvement in appearance; 1942, Award of Merit for best illustrative treatment; 1941, Award of Merit for best series of articles.



By **ALBERT DI GIACINTO**

ENGINEER, SPENCER, WHITE & PRENTIS, INC., NEW YORK

ESSENTIAL UNDERPINNING was recently installed at a mid-western plant busy on war work with no interference to the manufacturing process. Both the design and method of installing the underpinning were worked out with the thought in mind that normal factory operations were not to be interrupted. The plant consisted of a group of interconnected four-story brick buildings erected on spread footings during the first World War. The material underlying the footings consisted of clay to a depth of 37 ft. and about 11 ft. of sand and gravel overlying rock. Settlement started even before the structure was completed and from time to time, as it became necessary, various parts of the buildings have been underpinned by the writer's company.

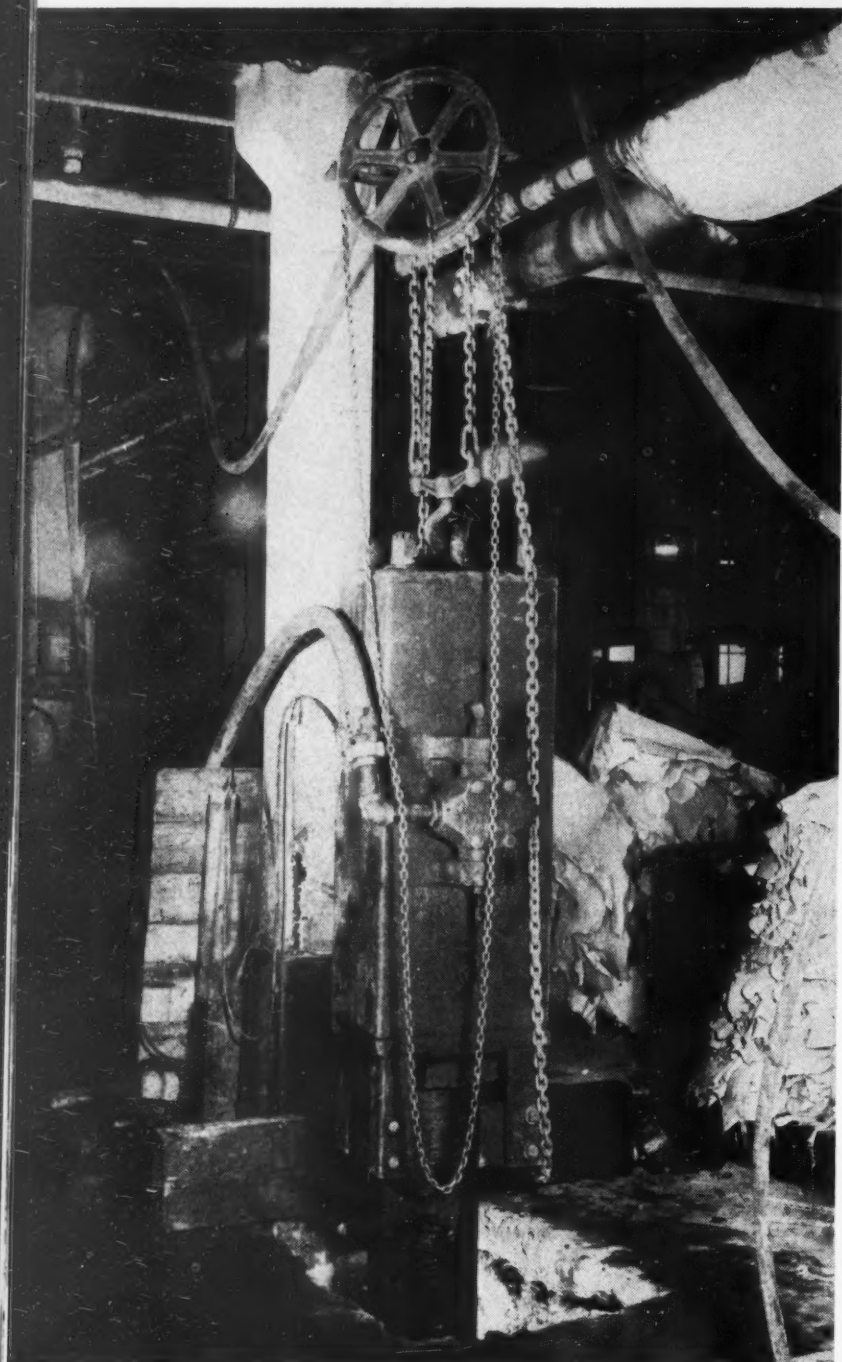
One phase of the present operations was to prevent further settlement of six interior columns which supported a new machinery installation in Building 8. Since the east wall of Building 9 had been underpinned to rock in a previous operation, the underpinning indicated on Fig. 1 provided 5 bays in which further settlement could not occur. At each of the six columns two 12-in. Tuba steel cylinders were driven to rock, excavated and filled with concrete. Two 8-in. beams welded to the column transmitted the load to two 20-in. I-beams which rested on 8-in. beams welded to the top of the cylinders. Holes were cut through the concrete footings to permit driving the cylinders close to the columns.

Cylinder Driving

The cylinders were driven with a No. 7 McKiernan Terry pile hammer suspended from the ceiling by an 8-ton chain hoist. Air for driving was furnished by a Chicago-Pneumatic portable compressor rated at 700 cu. ft. per min., which was set up, together with an air receiver, just outside the building. Pile sections forming the steel cylinders were limited to about 7 ft. by headroom and were joined by tight fitting internal

←
SUSPENDED FROM CEILING of Building 8, pile hammer drives 12-in.-dia. Tuba steel cylinders through openings in existing concrete footings to underpin interior columns. Pipe sections were limited by headroom to 7-ft. lengths, joined by internal sleeves.

MIDGET ORANGE-PEEL BUCKET, only 12 in. in diameter, removes clay from interior of 16-in. Pre-test steel cylinders in Building 9.
↓



Factory Underpinned

With Three Types of Piles
To Prevent Settlement of
Walls and Columns

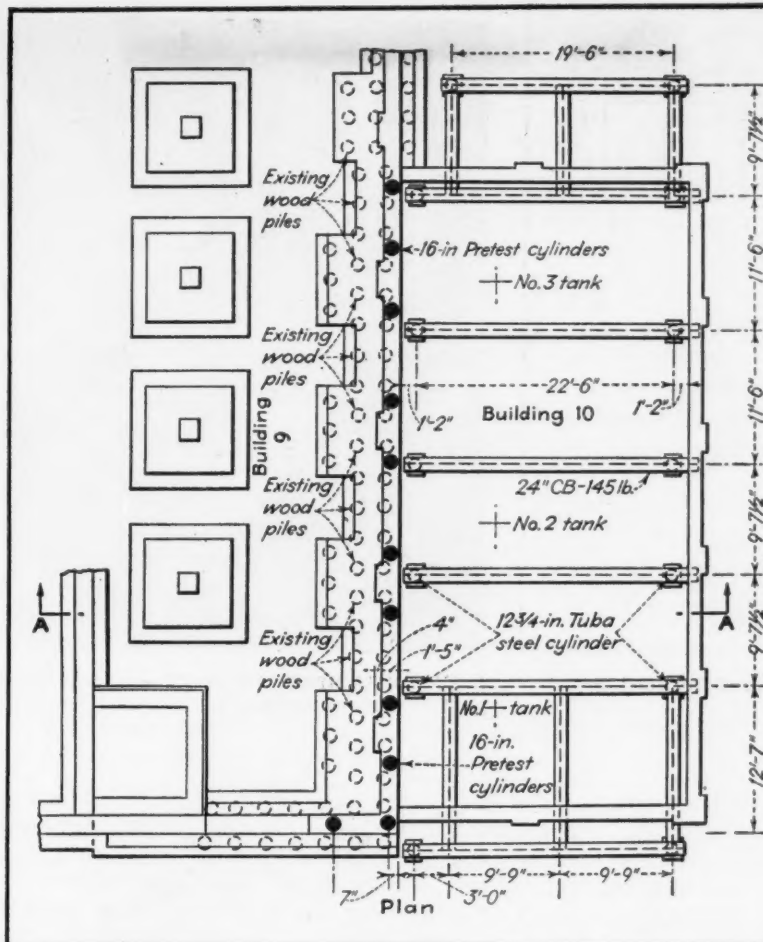
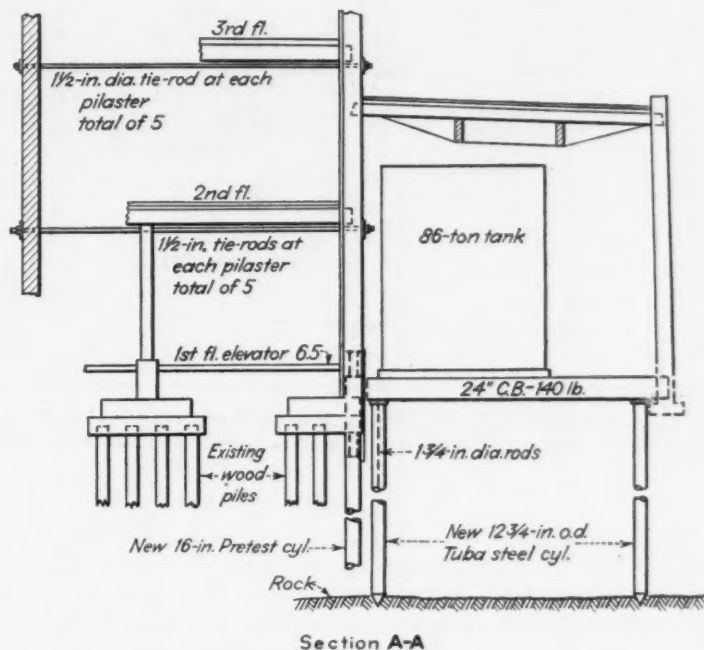


Fig. 2 . . . PRETEST CYLINDERS OF STEEL 16 in. dia. were jacked down beneath wall of Building 9 in 4-ft. lengths connected by welded sleeves. Cylinders driven from pits under existing wall are pre-tested to 90 tons, or 50 percent over design load.



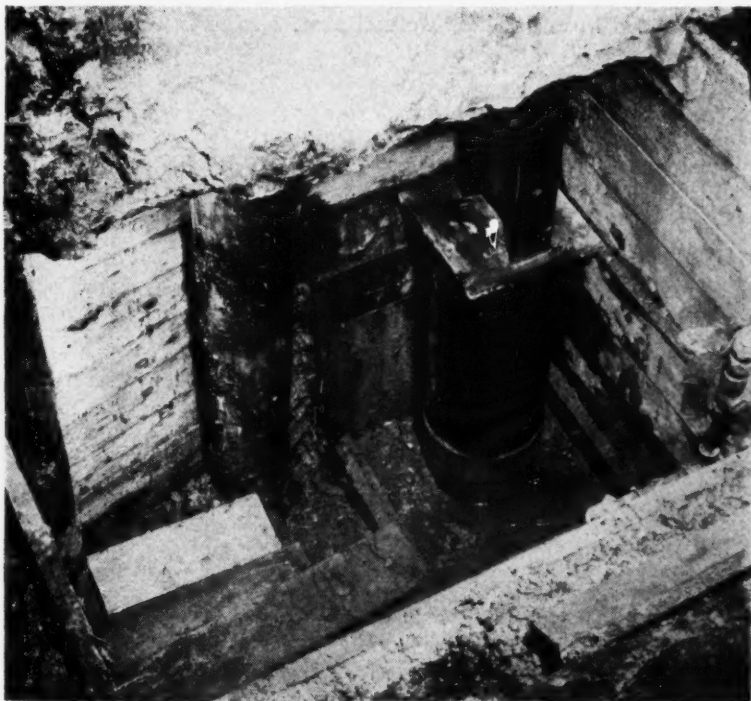
sleeves. After a cylinder had been driven to refusal on rock, it was cleaned by an auger and concreted.

In order to make room for the 20-in. beams which flanked the columns, parts of the concrete pedestals supporting the columns had to be removed. This was accomplished without difficulty and the load was transferred from the columns to the piles without any temporary shores. To pick up the load, steel wedges were driven between the 8-in. beams welded to the columns and the 20-in. beams. The columns were wedged

up $\frac{3}{16}$ in. Since the columns had settled $\frac{1}{8}$ in. during the installation of the cylinders they ended up $\frac{1}{16}$ in. higher than their position before the work started. Prior to driving the Tuba steel cylinders, level marks for observing each column were established and these were checked each day for settlement. After tack welding the various parts of the underpinning system together, the whole assembly was encased in concrete.

A portion of the north wall of Building 9 was also under-

UNDER WALL of Building 9 (below) Pretest cylinder 16 in. dia. is here shown in place after being jacked down through ground in 4-ft. lengths to support column of building.



LIMITED HEADROOM (below) in Building 10 demanded use of specially designed tower leads for handling pile hammer which drove 12-in. dia. closed-end Tuba steel cylinders.



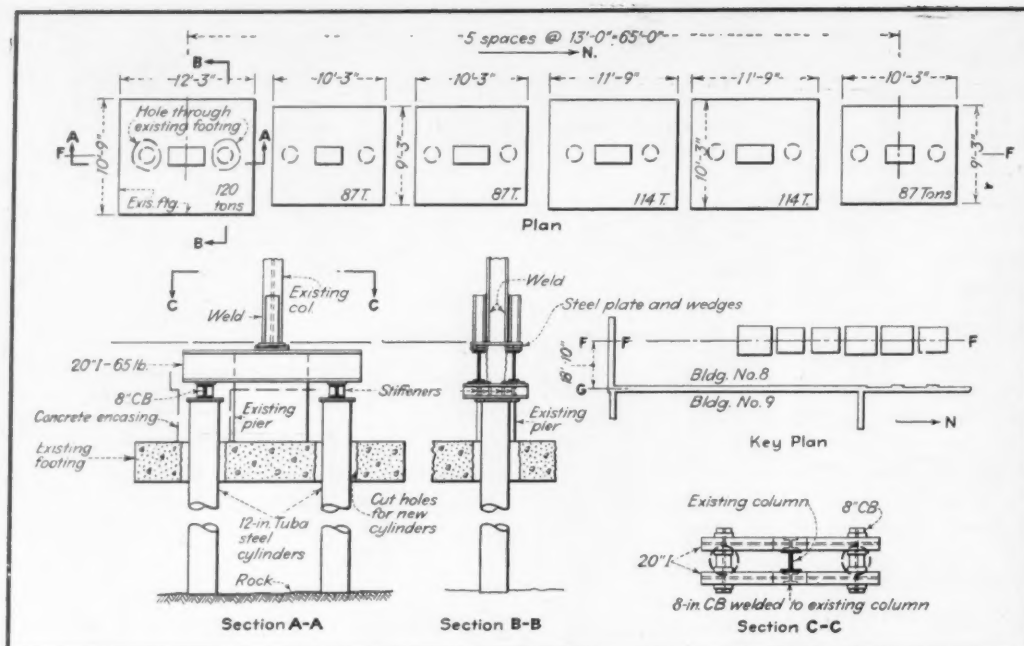
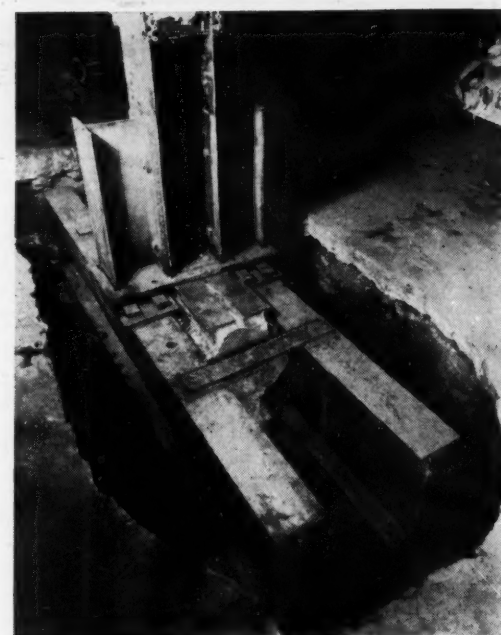


Fig. 1 . . . SIX INTERIOR COLUMNS of Building 8 were underpinned with 12-in. Tuba steel cylinders driven by pile hammer, cleaned out with earth auger and filled with concrete.



STRUCTURAL STEEL ASSEMBLY transmits column load to piles in Building 8.

pinned at this time. Shortly after the main buildings had been erected the addition known as Building 9, with a cantilever footing on wood piles, was added. The purpose of the present underpinning was to arrest settlement and lateral movement which had resulted in considerable cracking and distortion of this building. Since concrete tanks in adjacent Building 10 were now obsolete and were being demolished to be replaced by steel tanks, underpinning was carried out from this building without interfering with the operation of the factory.

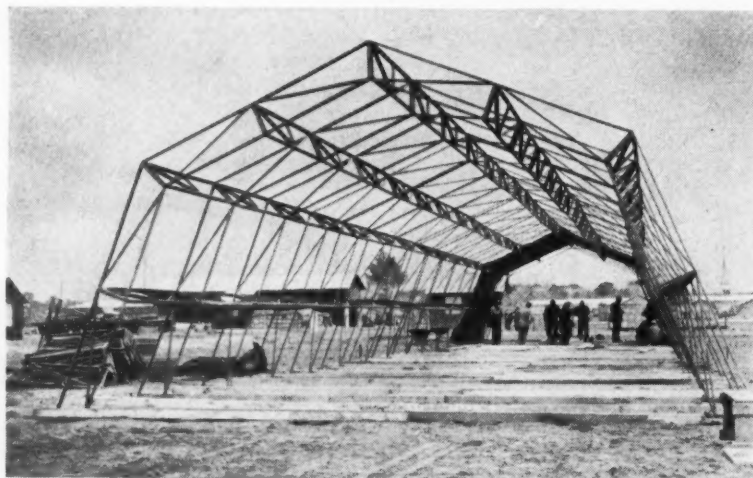
Eleven 16-in. Pretest cylinders, as shown in Fig. 2, were

jacked into a stratum of sand overlying rock. To determine the exact location for the Pretest cylinders, exploratory pits were excavated at each proposed location in order to expose the existing wood piles. The cylinders were then located between these wood piles as near to their theoretical location as possible. Since the wood piles had been driven in a rather erratic pattern and considerably out of plumb in many cases, care had to be exercised in locating the Pretest cylinders to prevent interference of the wood piles with the Pretest cylin-

(Continued on page 168)

Light, Prefabricated Buildings Store Engineer Supplies in Italy

PREFABRICATED SUPPLY STORAGE BUILDINGS consisting of light metal frames covered with either corrugated iron sheets or canvas are being constructed in Italy by troops of a U. S. Army Engineer depot. Channels and angles, prefabricated to form light panels, are welded together to form trusses of the larger of two types of structures pictured here. The smaller structure is made up of sectionalized trusses of light welded pipe.



LIGHT PREFABRICATED FRAME of supply storage building at Engineer depot in Italy consists of welded channel and angle sections. Frame is approximately 30 ft. wide at base. Pile of prefab panels ready for assembling can be seen at left.



SECTIONALIZED TRUSSES of light welded pipe are assembled to form frame of small supply storage building. Overall width at base of structure is about 24 ft.

Radiant Heating

KEEPS PAVEMENT CLEAR OF SNOW AND ICE

RADIANT HEATING installed out-of-doors at two eastern factories is eliminating the need for shoveling snow or chopping ice from sidewalks and driveways. Its post-war use in driveways leading to filling station gas pumps, as well as other outdoor installations, is predicted.

At the Bethlehem, Pa., works of the Sarco Manufacturing Corp., it was necessary to provide a snow- and ice-free walk between the main plant and the cafeteria. Since it was not feasible to erect a covered walkway, a concrete footpath was installed, with Byers wrought iron heating coils installed beneath. Hot water is circulated through the 1¼-in. pipes to melt the snow which falls on the footpath or to prevent formation of ice during a freezing rainstorm.

In a similar installation at the Hewitt Rubber Co., Buffalo, N. Y., low pressure steam from the plant's boiler is fed into similar size wrought iron pipe coils whenever it is needed to melt snow from the loading strip in the plant's yard. This installation is 80 ft. long and 8 ft. wide.

Radiant heating is also practical for loading platforms at industrial plants, as well as for service stations, supermarkets and other establishments that depend on automotive traffic, and passenger platforms and terminals of railroads.



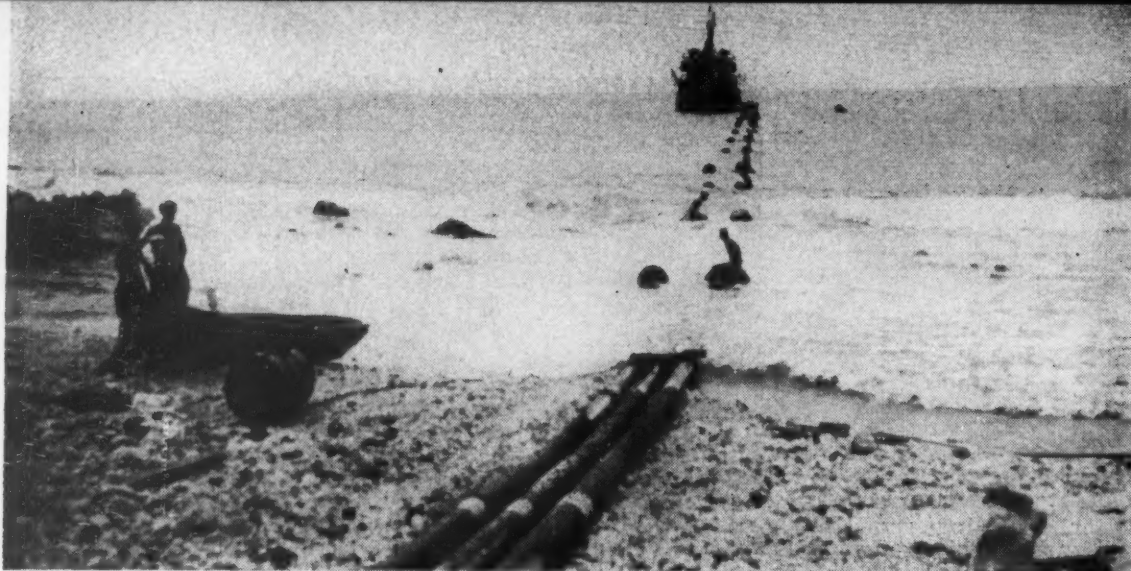
PIPE COILS of Byers welded wrought iron are laid under 80x8-ft. truck driveway at Hewitt Rubber Co. plant. Low pressure steam from plant's boiler is heating medium.



COMPLETED CONCRETE SLAB is poured over wrought iron steam lines to provide snow- and ice-free driveway.



SNOW-FREE SURFACE is result of hot water circulating through pipe coils under concrete crosswalks at Sarco Manufacturing Corp.



TRIPLE SUBMARINE PIPELINE 800 ft. long for delivery of gasoline and diesel oil from tankers is built by Navy's Seabees on island in South Pacific. Spacers to hold pipes proper distance apart during and after launching from shore consist of sections of steel channel bent to proper shape and welded to pipes.



WATER MAIN LEAKS are hunted by civil engineers from New York City's Bureau of Water Supply. Geophone, large stethoscope with two heavy copper disks instead of rubber cup, is used by **JOE McGRATH** (foreground), junior civil engineer, while two of his crewmen use aquaphones, which resemble old-fashioned telephone receivers attached to steel rods, to find exact spot of leak.

Wide World Photo

Page 96

UNDER 15 FT. OF WATER arc welding is accomplished by means of mild steel electrode with special coating which is impervious to water. Photo at right, below, was taken through porthole in special tank for training men in underwater welding and cutting operations in mechanical division of Panama Canal Zone. Test plate of sample weldments made under water



HOW

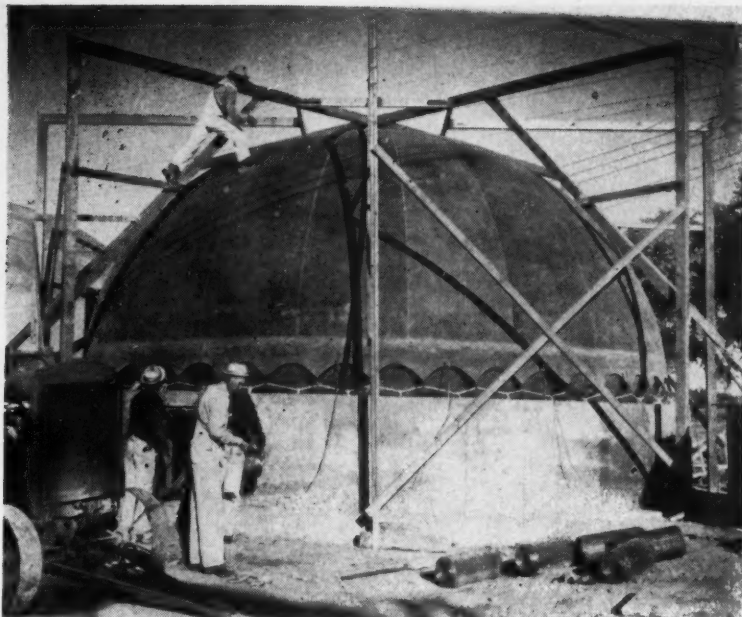
They Did It

CONSTRUCTION DETAILS

*For
Superintendents and Foremen*

(left) is held by welder-diver **R. L. E. COOK**, welding engineer for Armco International Corp. and representative of The Lincoln Electric Co. Behind him are (left to right) **W. BADDERS**, master diver; **CAPT. W. A. SWANSON**, and **J. R. MORGAN**, all of The Panama Canal Zone Authority. This is first time underwater welding has been successfully photographed.



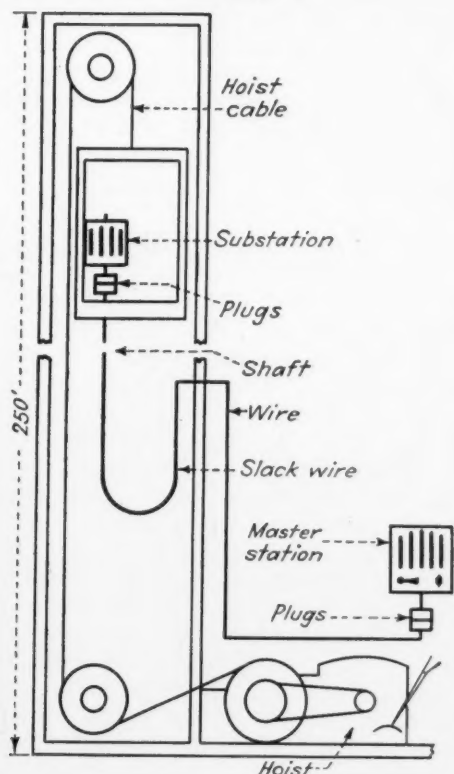


CONCRETE "AIRFORM" BUILDINGS, without girders or trusses, are built by Goodyear Tire & Rubber Co. on Litchfield Park, Ariz., ranch. Here hemispherical balloon, inflated by compressor and tied to 4-ft. sidewall, is covered by netting of ordinary chicken wire to reinforce concrete dome. Originator is Wallace Neff, Los Angeles architect.

Wide World Photo

DRAGLINE AND BULLDOZER cooperate to bank earth cover on igloo-type fuse and detonator magazine waterproofed with hot pitch and membrane cloth at new Naval Ordnance Plant near Camden, Ark. Contractors for project were Winston Bros. Co.; C. F. Haglin & Sons, Inc.; Missouri Valley Bridge & Iron Co.; and Sollitt Construction Co.

ELECTRONIC COMMUNICATION SYSTEM (below) speeds up hoist operation in rebuilding dome of Pennsylvania State Capitol at Harrisburg, recently completed by McCloskey & Co., general contractors, of Philadelphia. ("Construction Methods," August 1945, p. 70.) Drawing shows Executone master station for hoist engineer on ground with substation on hoist cage which conveys men and materials to various work levels.

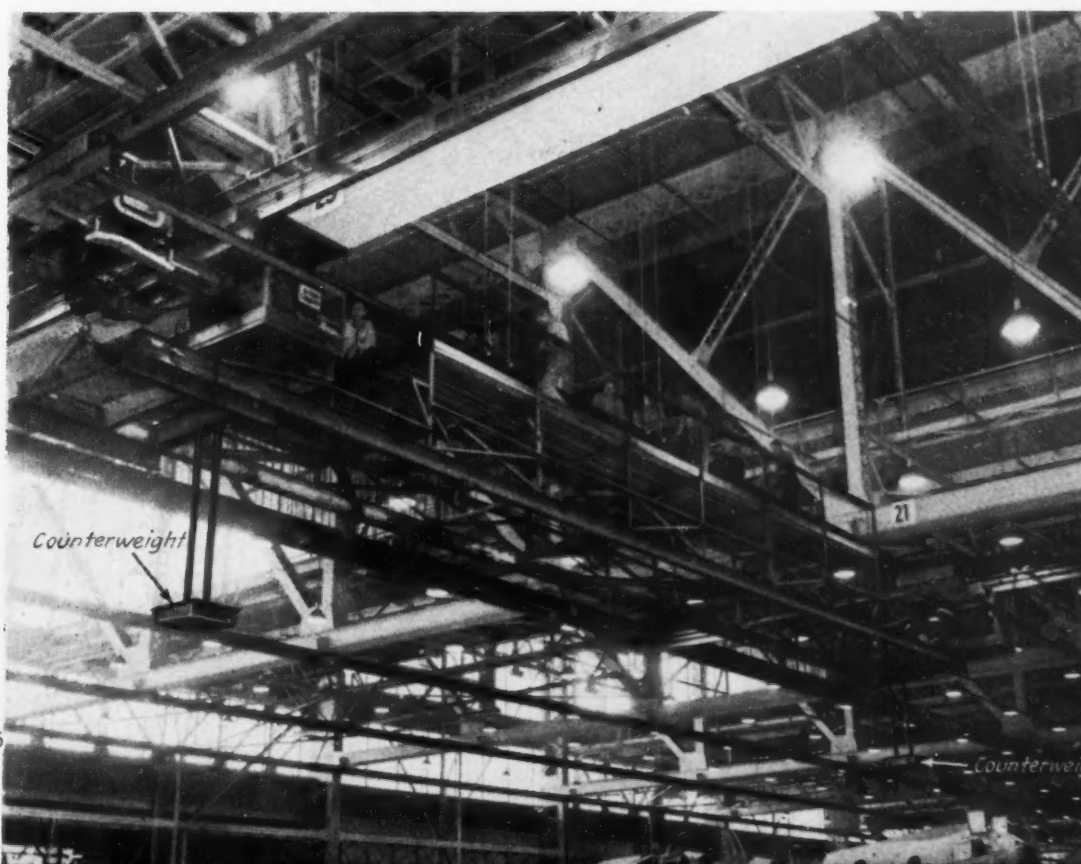


Page 97 — **CONSTRUCTION METHODS** — October 1945

AFRICAN AND BRAZILIAN DIAMONDS are set in core-drill bits (right) at Grand Coulee Dam for exploring bedrock at sites of Hungry Horse Dam on south fork of Flathead River in northwestern Montana and Palisades Dam on Snake River in southeastern Idaho. **AL MOREHEAD**, expert Bureau of Reclamation diamond setter, works soft steel of bit around diamonds to hold them securely in place during drilling.



REMOVAL OF MORE THAN 6,000 FT. of overhead crane rail (below), 60 ft. above floor level is completed without accident in building of Glenn L. Martin Co. at Middle River, near Baltimore, Md., by means of traveling platform which hangs from I-beam track being replaced. Each 50-ft. section of rail weighs 1,250 lb. Welded steel-frame platform about 60 ft. long and 4 ft. wide, with raised center section, is stabilized by 1,500-lb. sliding counterweights suspended 10 ft. below working platform. Using this device, eight men replace 200 ft. of rail per 9-hr. shift without danger to themselves or to airplane parts below.



Specialist Crews Follow Fast Schedule in Building

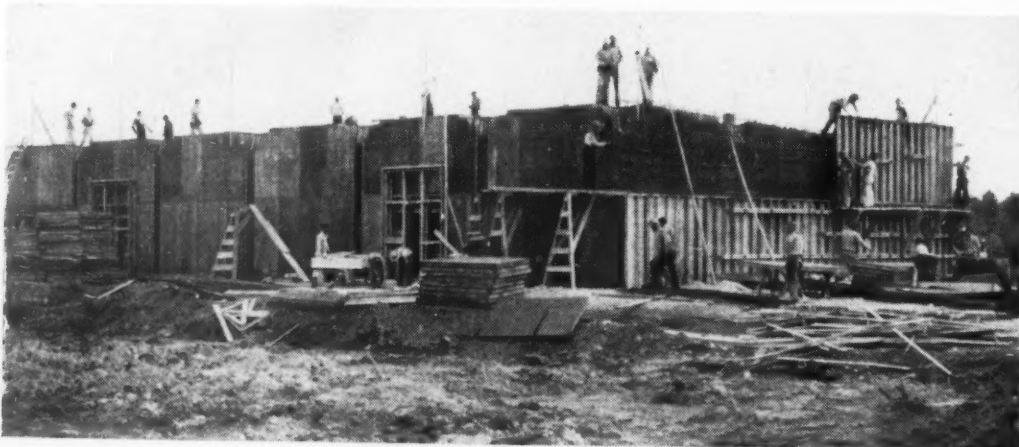


1 INITIAL OPERATION on first day calls for excavating footings for columns and walls here being marked out by wooden templates on top of compacted, graded fill. Crew comprises 30 laborers and 15 carpenters.



2 IN AFTERNOON OF FIRST DAY, floor-and-footing crew consisting of 18 laborers and eight cement finishers completes placing 190 cu.yd. of monolithic concrete by crane and bucket and proceeds to finish slab with gasoline-powered rotary float.

3 FOLLOWING PLACEMENT by 22 ironworkers and six laborers of reinforcing steel supported from interior shell of magazine forms on fourth day, separate formwork crew (below) erects exterior forms on fifth day.



Flat-Top Powder Magazines

SYSTEMATIC ORGANIZATION of ten specialized crews utilizing job-fabricated plywood panel forms and appropriate construction equipment enabled the WHMS combination, principal contractors for the Navy's \$100,000,000 rocket plant at Shumaker, near Camden, Ark., to set up a schedule calling ultimately for completion of one flat-top powder magazine per day in a storage area encompassing 100 of these units. Repetition of identical construction operations on a succession of duplicate reinforced-concrete structures made it possible for the crews to move ahead day by day from one unit to another and perform the same work for which they were specially trained and equipped. This procedure simplified the task of building flat-roof reinforced-concrete structures 50x100 ft. in plan, requiring 711 cu.yd. of concrete per unit, and made it feasible to schedule completion of one magazine per day. A general description of the rocket plant, naming the officers in charge of construction for the Bureau of Yards and Docks of the Navy, appeared in *Construction Methods* last month, September 1945, pp. 96-100.

Concrete Quantities

Of the total of 711 cu.yd. of concrete in each magazine, 210 cu.yd. was for column footings and floor slab, 6 in. thick, placed monolithically in one day, and 322 cu.yd. went into walls and roof, also placed as a unit in a single day. The remainder was needed for a loading platform and ramp, including footings and curtain wall, in front of the magazine, and for two wing walls projecting about 40 ft. from the sides of the structure at the front. These wing walls retain the earth fill placed over the roof, sides and back of the magazine for protection.

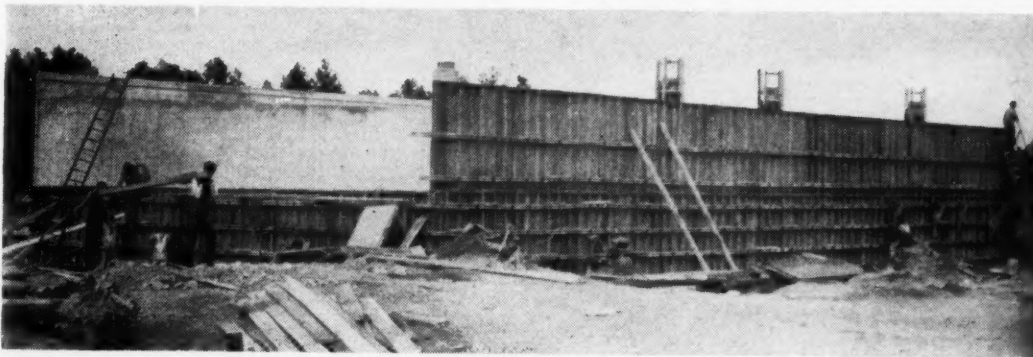
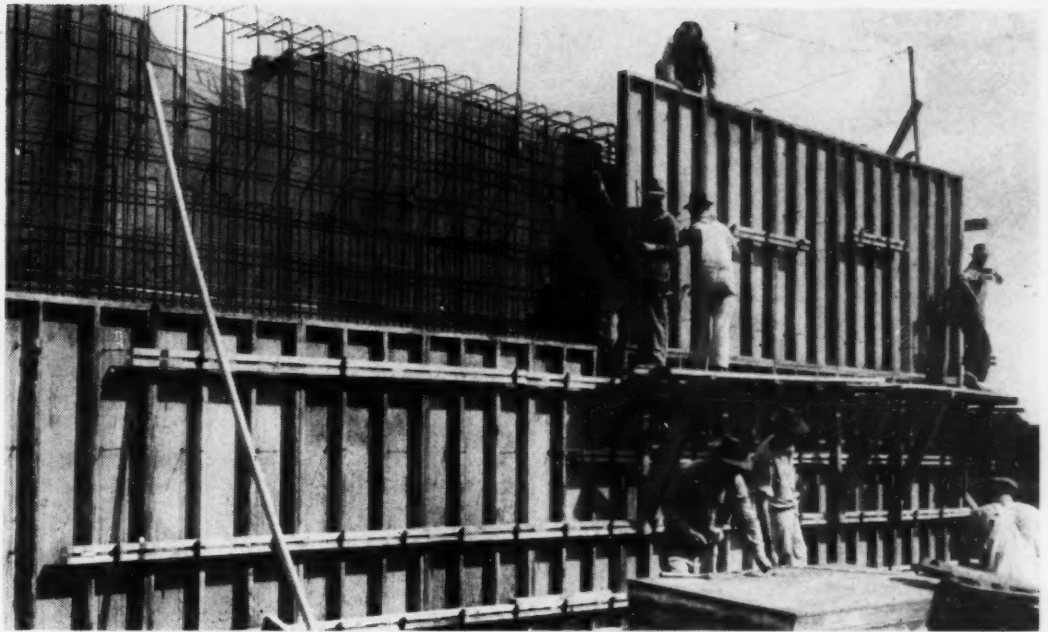
Panel forms of $\frac{3}{4}$ -in. plycrete grade plywood, fabricated and marked in accordance with shop drawings for accurate fit, were produced at a central yard near the heart of the storage-magazine

area, which embraced about 16 sq.mi. and included construction of barrel-type magazines at two other locations, 100 25x83-ft. igloos for high explosives and 15 25x23-ft. units for fuses and detonators. All these arch-roof magazines were built with steel forms.

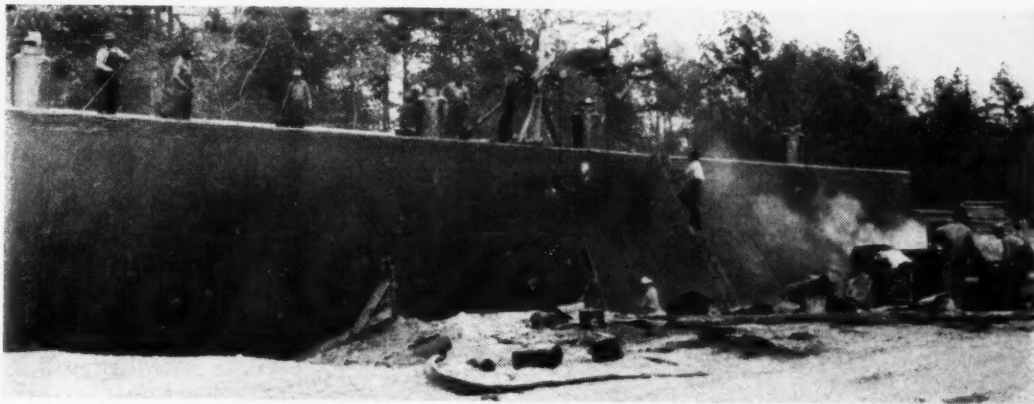
Plywood panels, marked for position in the formwork and accurately dimensioned for rapid assembly, were used four times before being retired from front-line duty to serve in the backs of wing walls, where the concrete would be buried by earth fill. One set of forms thus sufficed to complete four buildings,

(Continued on page 158)

4 PREFABRICATED TO EXACT DIMENSIONS and marked for position in structure, plywood panel forms go together quickly and neatly on four successive magazines before they are relegated to less demanding uses. Crew of 34 carpenters and ten laborers erects forms.



5 24 HR. AFTER CONCRETING, wall forms are removed by stripping crew of 30 men, carpenters and laborers, on seventh day in schedule of magazine construction.



6 CLOTH MEMBRANE in five plies, laid in hot pitch and mopped with same material, waterproofs roof of flat-top smokeless-powder magazine before structure is covered with earth fill. Three plies are placed on vertical walls. Crew includes 18 roofers and six laborers.



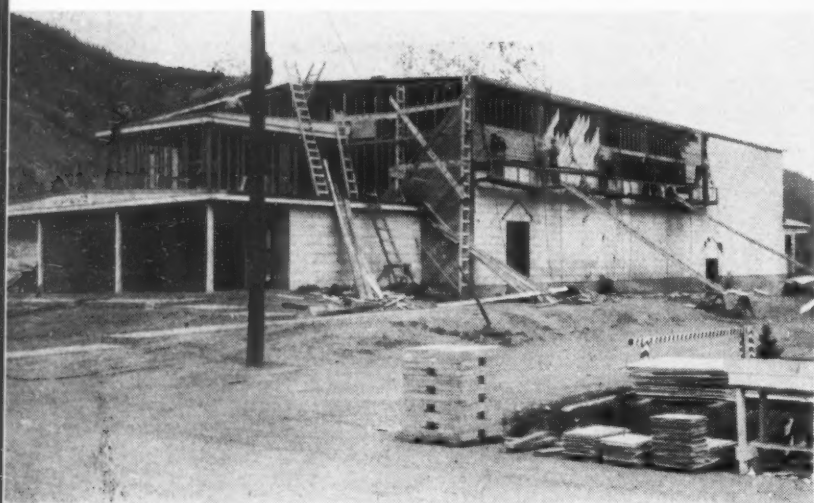
7 LOADING PLATFORM at front of magazine is supported by curtain wall which will rise from footing here being concreted. At right and in foreground are construction joint and vertical tiebars for wing wall to extend from magazine in direction indicated. Eight laborers and 20 carpenters work on forms for these portions of structure.

8 TRACTOR-BULLDOZER FINISHES SLOPES (below) on earth cover placed over waterproofed, reinforced-concrete magazine for storage of propellant powder. Ten laborers help to place fill and dress slopes.

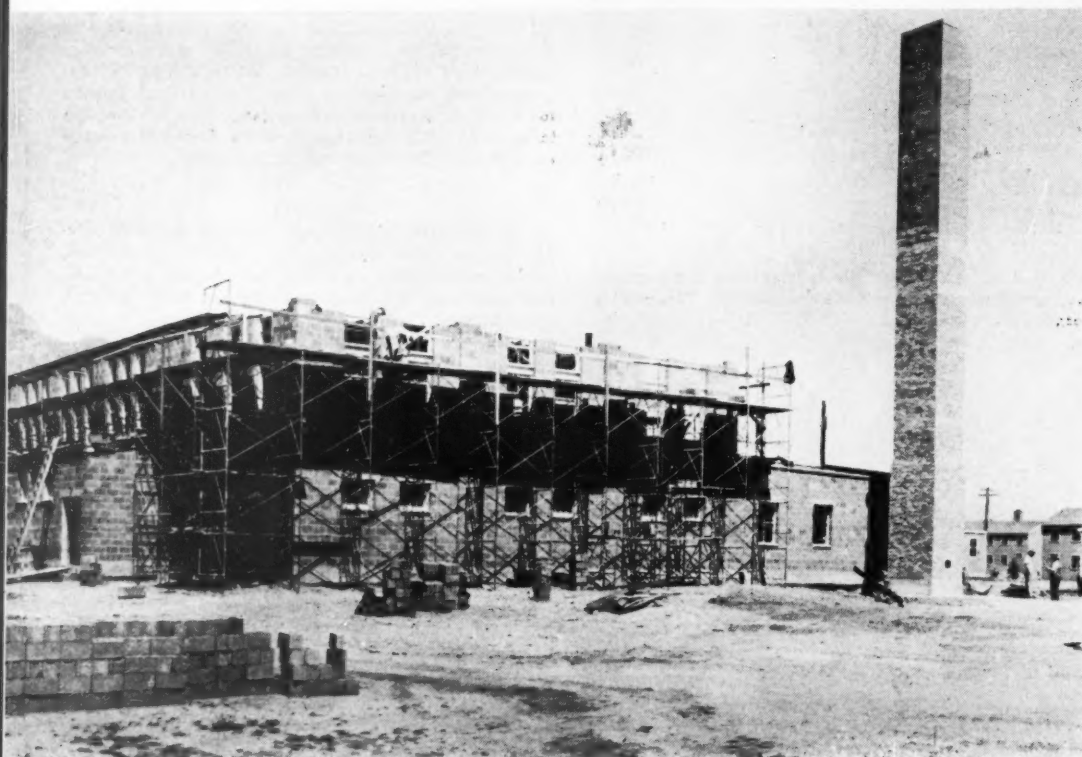




ECONOMICAL DISMANTLING of Camp Hale, Colo., by prisoner-of-war labor under Army Engineer supervision, furnishes critical materials for construction of 13 match-marked barracks at Ft. Logan, Colo., Convalescent Hospital.



SALVAGED CEMENT BLOCK (below) from Camp Hale is used in constructing recreation building at Carson General Hospital, Colorado Springs, Colo.



← **MATCH-MARKING** and cutting of buildings into panels for re-erection elsewhere, as for this theater at Black Hills Ordnance Depot, represents one method of dismantling. Some buildings are completely disassembled and materials salvaged for re-use on other war construction projects.

Dismantled Army Camp RELEASES CRITICAL MATERIALS FOR *New Construction*

EFFICIENT AND ECONOMICAL DISMANTLING of a \$32,000,000 military cantonment at Camp Hale, Colo. is releasing critical materials for new construction. German prisoner-of-war labor is being used to remove completely the installation, built for training mountain ski troops and now declared surplus by the fortunes of war. The clean, well-built camp in a beautiful Rocky Mountain setting would have been ideal as a hospital and convalescent station except for the 9,500-ft. altitude at which it is located.

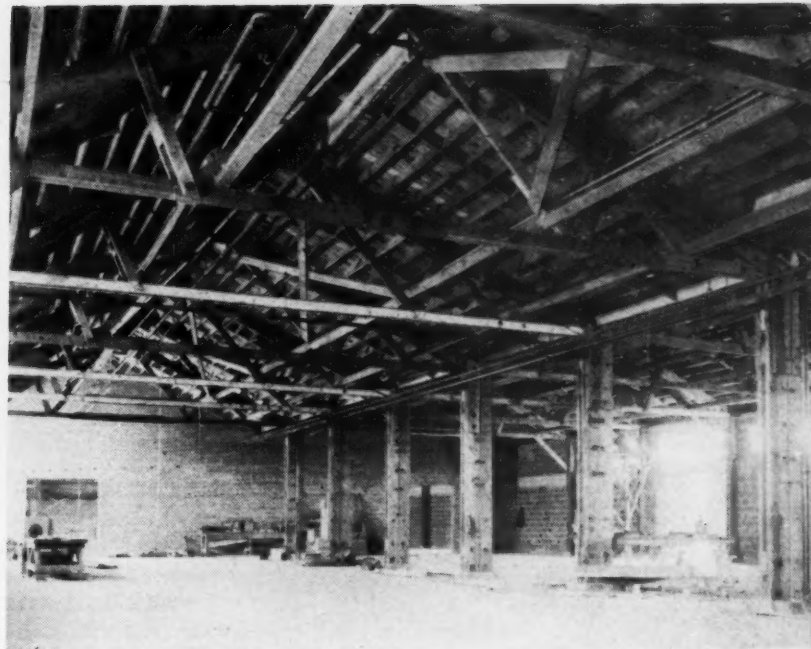
Lying in the Broad Eagle River Valley just west of Tennessee Pass, Colo., the camp is one of the best built cantonments in the country. It is designed for heavy snow loads and extreme weather conditions. Barracks and other occupied buildings are all insulated with Celotex, covered with cement asbestos shingle siding and slate-type asphalt shingle roofing. The larger shops and warehouses are of bolted wood truss roof construction, with 95-lb. slated roofing. Some of the buildings are taken down in sections for re-erection at other Army posts, the remaining are torn apart and all of the materials and equipment are sorted, reclaimed and shipped out, at a remarkably low cost. Use is being found for everything down to the last nail, shingle, brick and scrap of lumber. Three ski tows, part of the training equipment, have been turned over to the U. S. Forest service for subsequent civilian use.

Engineers in Charge

Under the general direction of Brig. Gen. R. C. Crawford, division engineer, Missouri River Division, and Col. James V. Johnston, district engineer at Denver, the unprecedented details for efficient and smooth operation were worked out by four men: Lt. Col. C. S. Stahl and



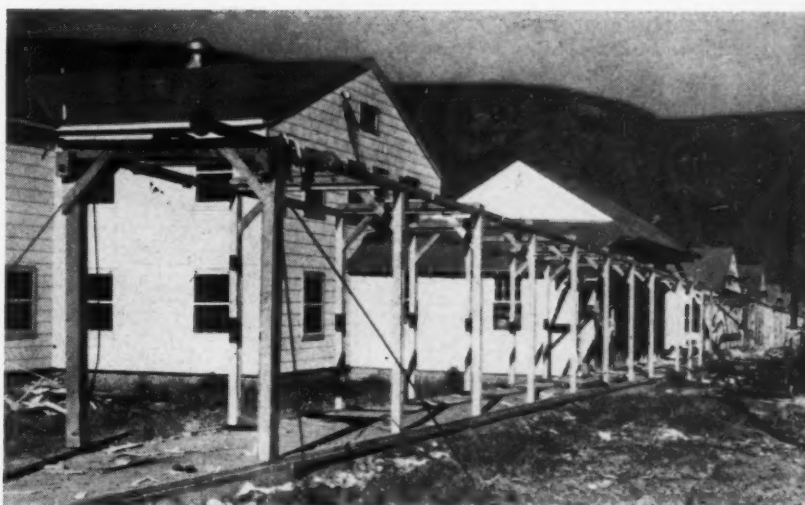
FIRE HYDRANT AND RISER are uncovered and removed by backhoe to be reconditioned and used elsewhere.



37-FT. BOLTED TIMBER TRUSSES of warehouses and other large buildings are removed intact by cranes for shipment as complete units; supporting columns are dismantled for shipment.



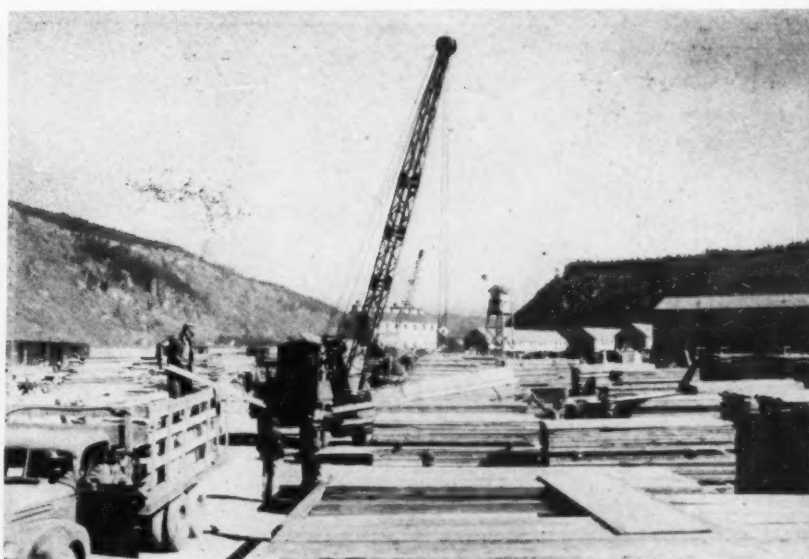
PROTECTIVE PACKING for fragile items is provided by squares cut from reclaimed fiber-board insulation. This material, hard to salvage in large pieces, is also used as insulation for refrigeration rooms and units.



STEAM LINE IS REMOVED in dismantling hospital covered-walk corridor. Prior to removal of line insulation is reclaimed for future use.



SCRAP LUMBER (left) from saw lines is used in making boxes, crates and pallets for shipping salvaged items (above) and for use by Ordnance Department, which up to July 1 had placed order for 270,500 such units.



LUMBER (below) IS TRIMMED to maximum standard lengths and trucked to storage area near rail line. Here, cranes use cable slings for unloading trucks. All heavy equipment is handled by civil service employees.



HEAVY SLATE FELT ROOFING is cut into standard-size multiple shingles by special shears built from scrap iron by prisoner-of-war blacksmiths.

Maj. Don A. McKinnon, construction engineers for the division and the district, respectively; Capt. Leon D. Howard, resident engineer at the job; and Coleman Mulligan, civilian general superintendent from Townsend, Mont.

Orderly Procedure—Since the project was not one of merely demolishing existing facilities, but one of salvaging desperately needed critical materials, an orderly procedure had to be established. Labor and supervisory personnel had to be housed and fed in buildings that were to be torn down, so it was necessary to keep such housing supplied with water and electricity while utilities were being demolished on all sides. Fire protection had to be intensified because of large stacks of lumber and other combustible materials.

Wrecking procedure had to follow a well-planned pattern to keep the workmen spread out, keep traffic lanes open, make possible a smooth flow of materials into sawmills and rehabilitation shops and provide temporary storage for certain materials being shipped out. In ad-

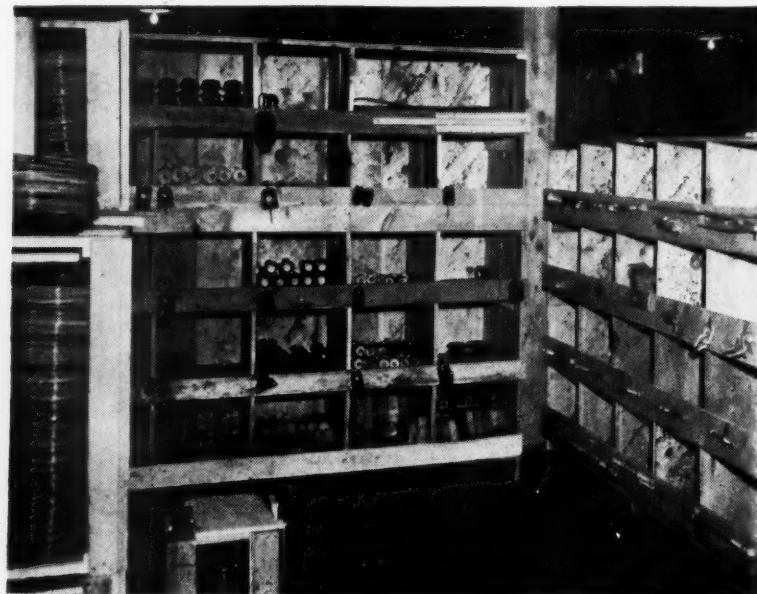
dition to these items it was necessary to arrange for procurement of salvaged materials, to provide for railroad and trucking facilities and, of course, to keep records of everything.

Salvage Cost Is Low—An idea of the size of the dispersing job can be obtained from the fact that 6 months after the job started, with 79 percent of the job complete, 879 carloads and 350 truckloads of salvaged materials valued at \$3,036,000 had been shipped out. Included in these figures are 14,800,000 b.ft. of lumber.

The efficiency of the work is indicated by the low overall cost to the government of \$410,230 for this same period. Prisoners are paid but 80c. per day, but comparable costs are also kept based on a labor rate of 80c. per hour, the prevailing rate in the Camp Hale district. A third set of cost figures, based on Denver union building trades rates, is kept for possible future use in estimating similar contract operations.

Under Capt. Howard, the job organization includes a few military aids; 350

ELECTRIC WIRING AND FIXTURES are taken to central shop for inspecting, cleaning and repairing if necessary. Wire (left) is rolled in lengths convenient for re-use and tagged as to type, size and length. Storage bins (right) are identified by sample items to help German prisoners in sorting materials.



civilian employees made up of area superintendents, foremen, timekeepers, office personnel, carpenters, electricians, plumbers and equipment operators; and 2,300 prisoners of war available for actual job duty.

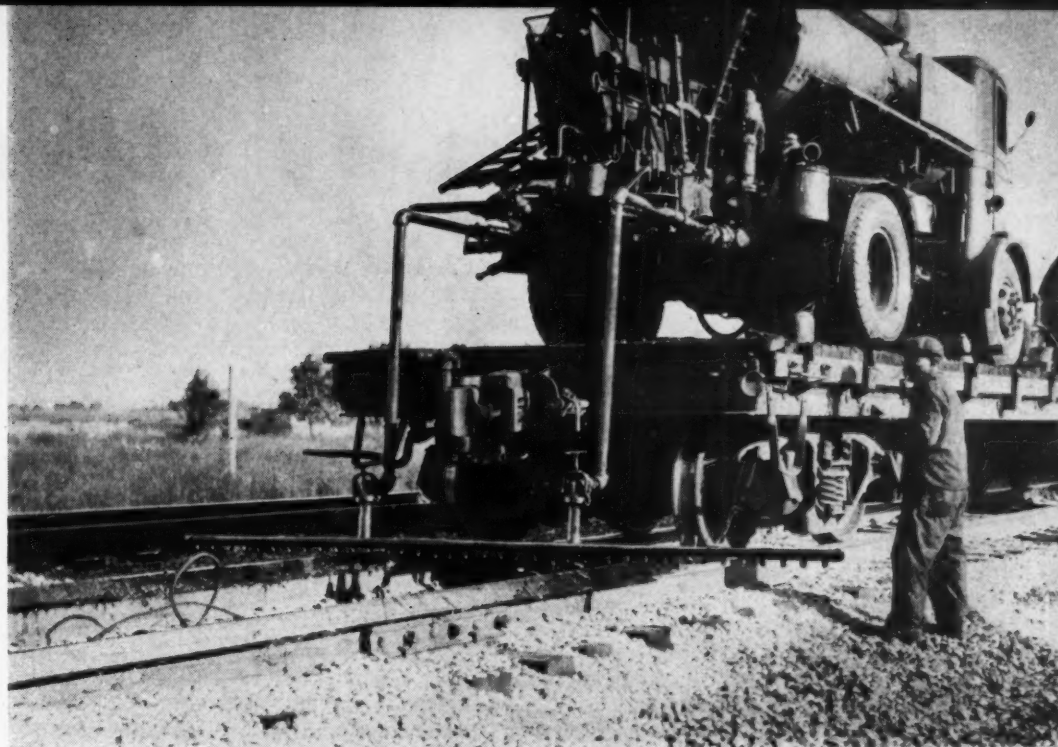
Wrecking and salvaging are primarily hand operations, but considerable equipment is also used including scores of trucks, shovels, cranes, bulldozers, compressors and air tools, saw rigs, and

(Continued on page 162)

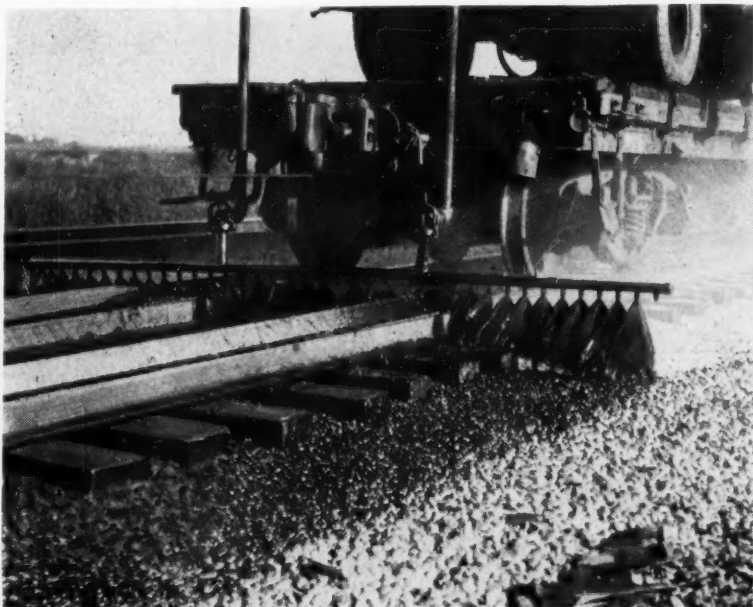
← **SOIL PIPES ARE SALVAGED** as final operation before leveling off area with bulldozer. All broken brick and other debris not worth picking up are covered over, leaving only concrete floors and foundation walls exposed. Studies are being made as to the feasibility of breaking up this concrete for use as riprap on nearby projects.

Distributor on Railroad Car Applies Asphalt to Track Ballast

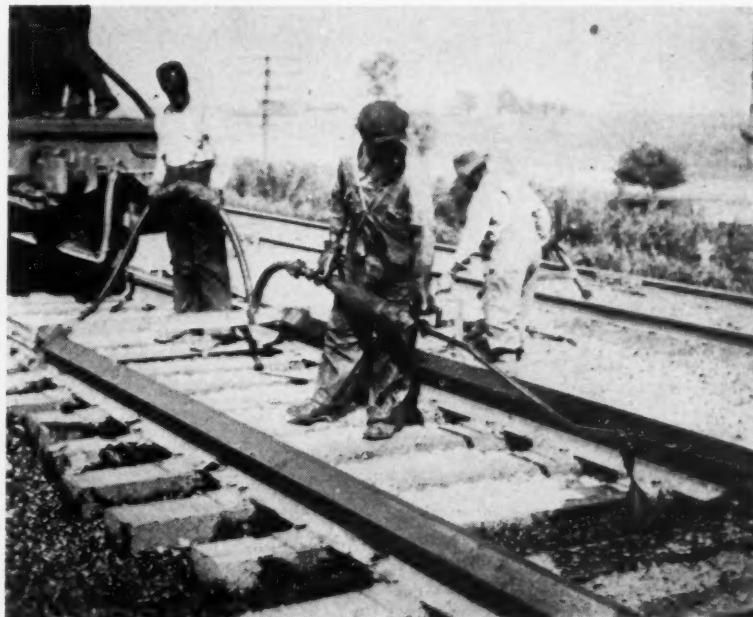
TO SPEED APPLICATION OF ASPHALT to ballast stone on a ½-mi. experimental section of main-line track at Manteno, Ill., the Illinois Central R.R. mounted a truck-type distributor on a flat car in a work train and applied the hot material to the ballast by a conventional spray bar lowered to a position just above the rails. Wood and metal guards riding on the



MOUNTED ON FLATCAR, truck-type distributor applies asphalt to ballast stone through spray bar suspended by pipe extensions below car coupling. Steel cables to be seen between rails are attached to stone car which follows distributor car in work train.



SPRAY BAR connected by pipe extensions to pressure distributor on railroad flatcar shoots hot asphalt on 12½-ft. width of track ballast. Sliding guards riding on rails protect tops of rails from asphalt.



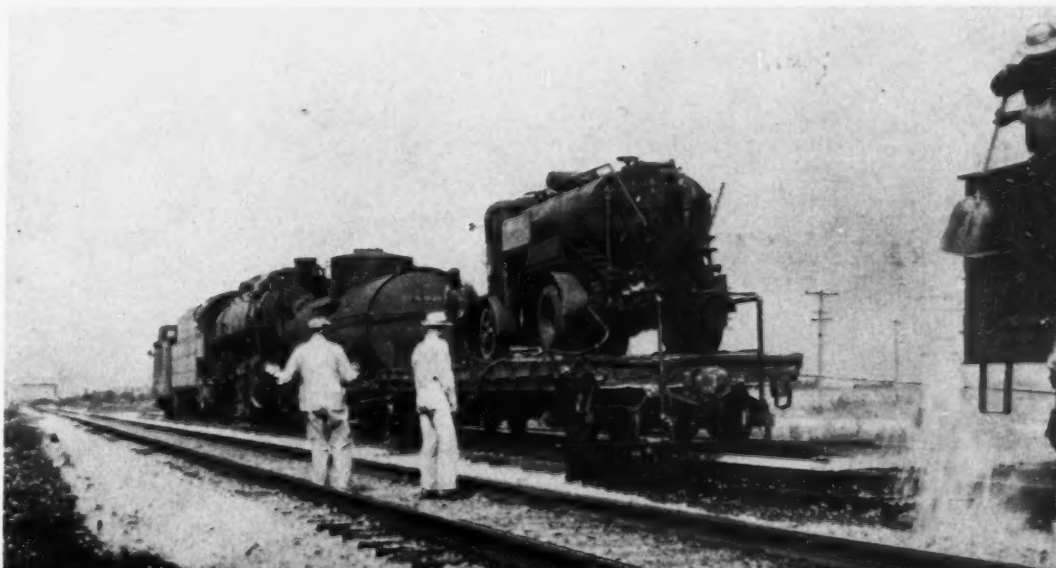
PRIOR TO USE of spray bar, hand nozzle is employed to make penetration application of asphalt to ballast stone on ½-mi. experimental section of Illinois Central R.R. at Manteno, Ill.

rails and moving forward with the work train protected the tops of the rails from the asphalt.

Two applications of 85-100 penetration Texaco asphalt were involved in the asphalt ballast installation, conceived by W. R. Macatee, of the Asphalt Institute, to test the effectiveness of an asphalt "roof" for improving stability and insuring cleanliness of ballast by preventing intrusion of surface water, dust and cinders. Following a penetration application of 2 to 3 gal. per sq.yd., stone screenings of ¾-in. to No. 4 size were tamped into the ballast to key the surface. A seal coat of 0.4 gal. per sq.yd. then was applied and covered with broomed fine aggregate. Stone for both applications was scattered

(Continued on page 162)

WORK TRAIN for asphalt ballast installation comprises tank car, distributor car and aggregate car from which cover stone is shoveled on top of asphalt application.



STATE HIGHWAY DEPARTMENT MAINTAINS

NORTH CAROLINA WAS THE FIRST STATE in the union to adopt a policy of maintaining and improving its entire public road system including all rural public roads, state highways and county road extensions within corporate limits of cities and towns. Its policy differs from that followed in most other states with the particular exception of Virginia, Delaware and West Virginia. In 1931 the North Carolina legislature passed a law requiring the state highway commission to take over all county roads and all responsibility in connection with county road systems which previously had been in the hands of county commissioners or county highway commissions. Thus the state is responsible today for a total of 60,812 mi., including about 11,371 mi. in the state system and 49,441 mi. in the county or secondary system.

Under the 1931 act the state took over all equipment used by the counties. A large part of it proved to be in such condition or of such type as to be uneconomical for road maintenance. The 1931 legislation also required the state highway commission to take over all county prisoners and use them in the maintenance of roads.

State Prisoners Employed

In 1933 the legislature went a step further and changed the name State Highway Commission to State Highway and Public Works Commission and placed the additional burden on this organization of taking over all state prisoners as well as county prisoners. Since that time, the organization created by the bill has been responsible for the feeding, housing,

guarding, general care and working of all prisoners who have been sentenced for more than 30 days, whether the sentence be for a felony or misdemeanor. These prisoners, who totaled about 10,200 just before the war and now number 5,700, are used largely for maintaining the roads of the state.

Many highway officials felt, until the war started, that prisoners hardly paid their way when compared with free labor. During the war, however, with the scarcity of free labor, prisoners have proved valuable for routine maintenance work on roads. It has been difficult to get free labor throughout the state; in many sections it has been practically impossible. Reduction in the number of prisoners has necessitated working them to the best advantage, with the result that in recent years it has been found that prisoners will do about as much work as free labor.

Scattered over the state are 87 prison camps, some of them not in operation at present because of the reduction in prison population. With camps situated at strategic points, it is possible to work prisoners on roads throughout the state with an average of a 10- to 15-min. haul. The prisoners work in gangs of from seven to ten; in the few places where heavy work is being done, they may be worked in larger gangs. Small groups have proved more economical, especially under present conditions, when even prison labor is scarce. The greatest difficulty experienced in this respect is in obtaining the number of prison guards required to handle the small gangs.

State Organization

At present the state is divided into ten divisions, each under the direction of a division engineer. There are three districts in a division, with a district engineer in charge of each. Under him are from two to three maintenance supervisors. There are 100 counties in the state; therefore, the average in each division is ten, but the number actually ranges from 7 to 14. Thus the system operates on a district and not on a county basis.

District engineers and maintenance supervisors are responsible for maintenance only and have nothing to do with construction work. The division engi-

By W. VANCE BAISE

State Highway Engineer,
North Carolina State Highway and
Public Works Commission,
Raleigh, N. C.



RELOCATED ROAD (above and below) with reasonably safe alignment, grades and sight distances provides easy travel for farm-to-market vehicles which furnish 90 percent of secondary road traffic. Relocation, below, eliminates curve and widens roadway.



NS 50,000 Miles of Secondary Roads

neers and their assistants, however, have charge of both maintenance and construction work within the division. Construction work is handled by a resident engineer, and his assistants, under the division engineer.

In the organization setup there is a state maintenance engineer who has general supervision over all maintenance work, and a state construction engineer who has general supervision over all road construction. The chief bridge engineer has charge of all bridge location, design and construction, as well as maintenance of bridges. The bridge maintenance engineer who reports directly to the chief bridge engineer has general supervision over maintenance of all bridges over 8 ft. in length on both the state and county system, and under him are five bridge maintenance superintendents, each hav-

ing various prison camps. These gangs handle all heavy maintenance work including shrubbing, heavy ditch cleaning, and the hauling and placing of additional stabilizing material for improving the general conditions of earth-type roads. The length of the average section on the secondary road system varies from 75 to 125 mi.

Fund Allocations

Funds appropriated for maintenance of state and county highways are allocated to the various divisions on the basis of a definite formula, giving consideration to area, population, road mileage, and motor vehicle registration. These funds are further subdivided on the same basis among the districts in the division. They are not allocated on any definite

IN TWO PARTS . . .

Part 1

formula to cover the work in each county involved; instead, the district engineers are required to use the funds in the various counties under their supervision according to the needs of the roads involved. Careful consideration is given to the amount of traffic carried by the various roads, as well as to the condition of the stabilizing material on those roads.

Sometimes more funds are used in



SAND AND GRAVEL for road stabilization are obtained from rivers and creeks in Piedmont section of North Carolina. Sand is either pumped (left) or removed by dragline (below) and stockpiled along bank of stream to be used as needed on secondary roads. Power shovel (above) loads river gravel into 1 1/2-ton dump truck for use in stabilizing roads.

ing charge of bridge maintenance work in two divisions. A sufficient number of bridge gangs is organized to handle the necessary maintenance work. These gangs are in charge of foremen who report directly to the bridge maintenance superintendents.

All roads are maintained on a section system, which we feel is the key to proper maintenance, with a foreman in charge of each section responsible for that particular section. The section foreman has one or more helpers to take care of all routine maintenance work involved. In addition to section forces, there are floating gangs, each consisting of a foreman and a group of prisoners, working out of



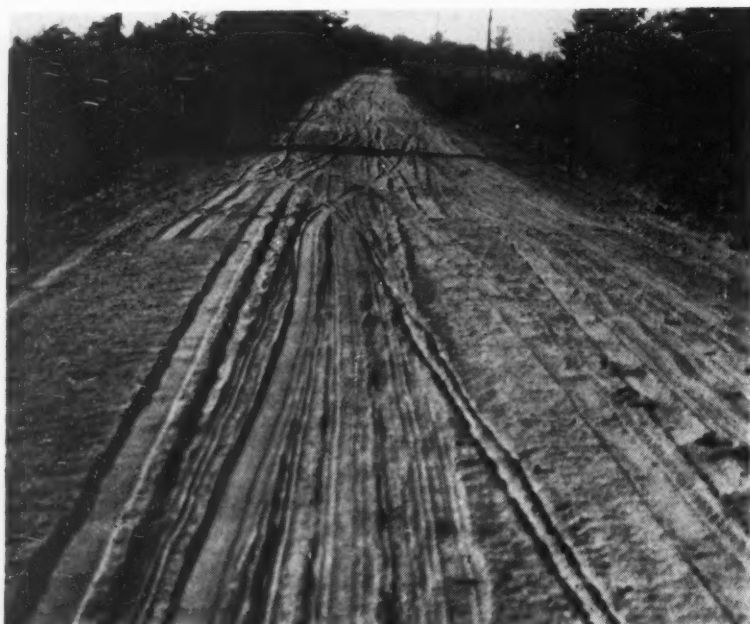


TRACTOR-DRAWN 6½-CU.YD. SCRAPER removes humps and fills low spots to improve grade of roads in Division 4, near Wilson, N. C.

poorer, isolated counties than the formula (if applied to counties) would permit. In other words, distribution of funds is equalized to some extent among various counties in each district to maintain all roads in about the same condition, based on the amount of traffic which they carry and the availability of material for stabilizing them.

Important Roads Take Precedence

Since taking over the county roads in 1931, stress has been given to improving the more important ones and keeping them in condition to take care of traffic during the entire year. For instance, where there are two parallel paved state highways, the policy has been to give first preference to improving the county road that fairly well divides the distance



ADDED SAND is placed on section of county road in Iredell County to stabilize road and replace material lost by action of rains, fast-moving traffic and winds, an amount estimated to average 1 in. per year from earth surfaces on secondary routes in North Carolina.



SUSPENSION FOOTBRIDGE, built and maintained by North Carolina State Highway and Public Works Commission, provides pedestrian access to school buses and all-weather highway. School buses travel 46,000 mi. daily on state system during school months.



between the state highways. In many cases such county roads have been paved with a low-type pavement

After these roads have been placed in satisfactory condition, stress has been given to the next most important road between the paved highways. This policy has been followed until the present time. The result is that there are very few places where it is necessary for res-

(Continued on page 140)

← **GREATEST POSSIBLE USE** is made of local material in stabilizing secondary roads. Here (left) windrowed material is flattened by motor grader, and disk which follows mixes sand and gravel with clay from subgrade. Motor grader in distance is windrowing mixed material in center of road to be spread and shaped to desired cross-section.



NEW CHIEF OF ARMY ENGINEERS is LIEUT. GEN. RAYMOND A. WHEELER, Commander of India-Burma war theater since July, 1945, and Deputy Supreme Commander of Southeast Asia Command. He succeeds Lieut. Gen. Eugene Reybold who has commanded Corps of Engineers since October, 1941. General Wheeler is three-time holder of Distinguished Service Medal.

Signal Corps Photo



NAMED CHIEF ENGINEER of New York City Tunnel Authority in initial move to consolidate this agency with Triborough Bridge Authority is RALPH SMILLIE, chief engineer of design of Port of New York Authority. He succeeds Ole Singstad, who will continue as consultant until end of year.

Affiliated Photo by Conway



DISTRICT ENGINEER at New York of U. S. Engineer Department is COL. CLARENCE RENSHAW, who succeeds Col. Edgar W. Garbisch, now on leave. Col. Renshaw was recently awarded Legion of Merit for his work in directing design and construction of Pentagon Building in Washington. He also had important part in construction of Army cantonments before and after Pearl Harbor.

Signal Corps Photo



MISSISSIPPI RIVER COMMISSION is now headed by MAJ. GEN. ROBERT W. CRAWFORD, former assistant chief of staff, G-4, Supreme Headquarters, AEF in European Theater. He has served as chief of Construction Section, Office of the Chief of Engineers, and as district engineer at Duluth, Minn., Washington, D. C., New Orleans, La., and Honolulu.

Signal Corps Photo



ENGINEERING AND ECONOMIC SURVEYS are being made jointly by eight agencies of U. S. Department of Interior for \$1,500,000,000 development program in Missouri River Basin. Chief of staff which will coordinate progress reports of investigations and supervise preparation of comprehensive monthly reports is MILLS E. BUNGER, who joined Bureau of Reclamation staff in 1930.



CONSTRUCTION FOR RECONVERSION will be expedited by JOSEPH O. KEENAN as special assistant to chairman of War Production Board. He will also represent WPB on Inter-Agency Committee for Construction set up by Office of War Mobilization and Reconversion. Former WPB vice-chairman for labor production, Mr. Keenan has served as secretary of Chicago Federation of Labor.



← **OPERATIONS OF CHICAGO'S TRANSPORTATION FACILITIES** will be directed by recently appointed seven-man Chicago Transit Board, with PHILIP HARRINGTON (left), who directed design and construction of city's first subways, as chairman. VIRGIL E. GUNLOCK (right), former chief engineer of Department of Subways and Superhighways, succeeds Mr. Harrington as commissioner of this department and will direct its post-war construction program.

October 1945 — CONSTRUCTION METHODS — Page 107



LABOR *and* MANAGEMENT MEET — *for* PEACE *or* CIVIL WAR?

THE prospect of a knock-down and drag-out fight in the automobile industry does not augur well for the reconversion outlook, which upon every other score is bright. Any widespread outbreak of the type of industrial warfare which now threatens will disrupt, more thoroughly than anything else on the horizon, an orderly transition to a peacetime economy.

It is doubly unfortunate that there should be a general tightening of union and company battle lines upon the eve of the Labor-Management Conference, which on November 5th will convene at President Truman's direction for the purpose of "working out by agreement means to minimize labor disputes." If the current work stoppages occasioned by industrial conflicts should increase rather than diminish between now and November first, the Conference atmosphere hardly promises to be favorable to a dispassionate examination of basic issues.

Yet the shadow of the threatened industrial storm that hangs over the Conference only serves to emphasize the importance of reaching satisfactory agreement upon two problems with which such a Conference might deal. The first is that of determining what machinery shall be used for settling disputes upon which employers and workers have reached an impasse. The second, and more far-reaching, is that of arriving at some common understanding upon the major issues which commonly lead to irreconcilable disputes.

Settlement of Wartime Disputes by the War Labor Board

During the war the first problem was handled largely by machinery centered in the National War Labor Board. Supported by general adherence to patriotic pledges by labor leaders and employers not to resort to the use of economic force against each other during wartime, and backed up on rare occasion by use of the President's power to seize plants for war purposes when its orders were not obeyed, the Board managed, by what amounted to compulsory arbitration, to settle the nation's wartime labor disputes with relatively little economic loss.

But it can scarcely be claimed that the War Labor Board did much to resolve the issues from which disputes grow. Indeed, the fact that it was available to issue orders in cases which the Secretary of Labor certified as likely to "lead to substantial interference with the war

effort", resulted in the conversion into full fledged disputes of many disagreements which would otherwise have been settled at a local level in the course of collective bargaining. Meanwhile, local collective bargaining machinery which should have been doing most of this work was neglected, and will need thorough reconditioning even to be brought back to its prewar level of effectiveness.

With V-J Day came an abrupt change in the status of the War Labor Board. One of its main props, labor's "no strike pledge", was promptly withdrawn. It could no longer rely on the President to use his power to seize plants for war purposes to force obedience to its orders. Consequently the Board agreed that it would accept new cases only if both parties to the dispute stipulated in advance that they would abide by the Board's findings, that it would clear its dockets of old cases as rapidly as possible, and that it would then go out of business, leaving to the Labor-Management Conference the question of what should take its place in the postwar period.

What Shall Take the War Labor Board's Place?

The immediate and pressing task of the Labor-Management Conference is to agree upon machinery for settling industrial disputes in the peacetime economy.

Neither management nor labor wants the continuation of compulsory arbitration to which they submitted as a necessary war measure. But it must be clear to everyone that if any substantial proportion of the disputes that inevitably arise are settled by resort to strikes and lock-outs, economic anarchy will result. Not only will it be impossible to achieve the high levels of output and employment that have been set as postwar goals, but it is questionable whether our economy could survive. The only alternative to compulsory arbitration under government auspices is for management and labor to demonstrate their ability to effect a peaceable resolution of their differences without it.

The most obvious need is to set up local machinery at the grass roots where disputes originate. That is where most of them should be settled by local negotiation and, when that fails, through voluntary submission to mediation or arbitration under terms of reference to which the parties agree. Many issues, which at plant level are relatively simple in character, are blown up to formidable dimension and complexity when they are passed along

the line for decision in Washington. The centralizing process is one that frightens everyone connected with it because it focuses attention upon the possible importance of precedents established by a decision, rather than upon resolving satisfactorily the particular dispute at hand.

Unquestionably, some Federal machinery must be provided which may be called upon in cases where the size or implications of a threatened dispute clearly run beyond local jurisdiction. That will mean the thorough revamping of conciliation and mediation machinery which exists, but which has grown rusty through disuse while compulsory arbitration was the order of the day.

At least, this involves a complete overhauling of the United States Conciliation Service with a noteworthy strengthening of its personnel. There may be wisdom also in recently advanced suggestions for the creation of a board of arbitration to act in cases voluntarily submitted by the parties concerned, and for boards of inquiry to make reports upon the merits of disputes in which the public interest is concerned. But there is valid ground for questioning what appears to be the common assumption that such machinery should be located in the Department of Labor. It belongs neither there nor in the Department of Commerce. For the work which such agencies are called upon to perform, both the appearance and fact of complete impartiality are essential to effective performance. Assurance of impartiality will not be fostered by placing them in a department specifically charged by Congress with the task of advancing the interests of wage workers.

Resolving the Issues Over Which Disputes Arise

It may be, as many think, that the forthcoming Labor-Management Conference cannot effectively handle any problems beyond the procedural ones suggested above. If that is true, its agenda probably should be restricted to planning the reconstitution of collective-bargaining and dispute-settlement machinery, in view of the urgent need for putting it in working order.

But either in this Conference, or in subsequent ones, there will have to be an attempt to reach a reasonable measure of labor-management accord upon certain basic issues over which most industrial disputes originate. The best of machinery can be swamped if disputes are generated in ever-increasing number.

Most important of such issues is that of the fair determination of wages. There is clear need for reaching agreements at least upon the major factors on which such determination should rest. It seems evident that if we are ever to hope to reach the high levels set and generally accepted as postwar goals, we must harness economic incentives to promote production efficiency. That means that workers, as well as management, must be given a genuine stake in increased productivity. No universal formula is possible, but we should be able to agree upon general principles for dividing returns derived from improved performance in output between workers and investors, and consumers in the form of lowered prices.

Again, since unionism is here to stay, general accept-

ance by management of the principle of collective bargaining would save innumerable disputes which are concerned more with the method of negotiation than with the concession sought. Few in management still question the validity of the collective bargaining process as such, but there are many matters to be resolved of which the question of the open shop, the union shop, or the closed shop is merely a conspicuous example, upon which there is wide divergence of conviction between and within labor and management groups.

On the management side, there is sincere concern about the intent or ability of union leaders to exercise responsible control that assures compliance with contractual obligations. Wild-cat strikes are of sufficiently frequent occurrence to give substance to this distrust, and union discipline seldom has been administered in a decisive or effective fashion. The prospective rivalry of three competing labor organizations of national scope gives management little confidence that a bargain made and kept in good faith with any one of them provides assurance against work stoppages.

All of these matters, and many others, need thrashing out between management and labor, with the view of arriving at as large a measure of specific and detailed agreement as can be achieved. The greater the area of such agreement, the smaller will be the area for disputes that must be handled by settlement machinery, or put to the final test of force.

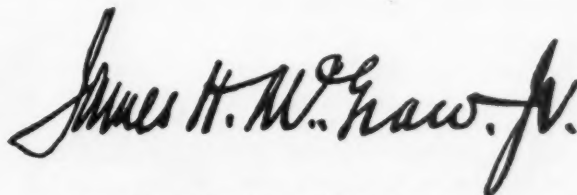
Peace or Civil War in Industry

The Labor-Management Conference is of major importance to national welfare. It is important even if it restricts its objectives to the procedural problem of how industrial disputes are to be handled.

It can make an even larger contribution if it lays the groundwork for an attempt to reach working agreements upon such policy issues as have been cited above.

Neither management nor labor can afford to lend anything less than their best intelligence and effort to an attempt to arrive at common understanding. Success will mean that we have a genuine chance of reaching new levels of economic well-being. Failure will mean industrial civil war, in which the casualties will be high. One almost certain casualty of such a war will be the principle of collective bargaining, since the Government can scarcely refrain from establishing compulsory arbitration if sufficient breakdown occurs.

It is to the vital interest of both management and labor to demonstrate that they can responsibly control themselves.



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THIS IS THE 40TH OF A SERIES

LEGAL ADVENTURES

of TRACTOR CONN



By **LESLIE JOBB**

No contractor ever tries to be his own dentist or his own shoemaker. It is even more dangerous for him to be his own lawyer. There are, however, some legal rules which every contractor should know, and these rules may be explained in plain English without resorting to the jargon of the law, unintelligible to most laymen.

This series of articles, dealing with the Legal Adventures of Tractor Conn, a typical contractor anywhere in the United States, explains some of these legal points in plain language for the contractor. Each one is based on an actual decision of an American Court.

The Case of the Architect's Plans



"All plans submitted in this competition will be judged by a board of disinterested and expert architects before a choice is arrived at," a Canadian hospital board advertised. A number of contractors, including Tractor Conn, submitted plans, but the plans were not submitted to a board of architects. Tractor Conn sued for the value of his

plans.

"You have no case, for even if we'd submitted the plans to the architects and they had selected yours, there was nothing binding us to adopt it," the hospital board pointed out. The Canadian Courts upheld their contention in the case of *Walbank vs Protestant Hospital*, 7 Montreal Q.B. 166.

The Case of the "Accidental Collision"

Tractor Conn's trucks were insured against "accidental collision" and, while the policy was in force, the driver of one of the trucks turned a curve at too fast a rate, shot off the road, down a gulch, overturned, and, as the Court afterward expressed it, "the truck thereafter ceased to exist as a going concern."

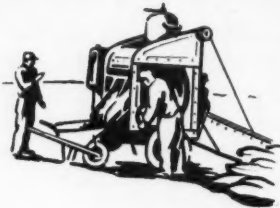
As soon as the matter was reported to Conn, he promptly made a claim under the policy.

"There was no 'accidental collision' within the meaning of the policy," the insurance company contended.



"The truck collided with the rough ground in the bottom of the gulch hard enough to upset it, and if it isn't collision, I'd like to know what you'd call it," Conn retorted. It went to Court, and the Supreme Court of Washington ruled against him, on the ground that a collision with the earth is not covered by a policy against accidental collision.

The Case of the Warranted Concrete Mixer



"That seems like a lot of money to put into a concrete mixer during these times," Tractor Conn demurred.

"Yes, but I warrant this mixer is thus and so and I'll replace any part free of charge that does not come up to the warranty," the salesman announced.

"I'll take it on those terms," Conn agreed. He did not pay for it and the seller sued in the Minnesota courts.

"The concrete mixer didn't come up to your warranty," Conn pleaded.

"That's the first time I heard of it," the seller retorted. "If you had notified me I would have replaced or repaired any defective part."

"You made the mixer and you should have known it was defective," Conn countered.

"No, you knew it first. The burden was on you to notify me," the salesman maintained and the Minnesota Court ruled in his favor, in the case of *Beckett vs Gridley*, reported in 69 N.W. 622.

The Case of the \$5,000 Mortgage

Tractor Conn built an apartment house for Adams, the contract price was paid, and everything was settled between them.

"There's a \$5,000 mortgage against this building, but apart from that there are no claims or incumbrances against it," the owner averred, and sold the building to Tractor Conn.

Conn paid for the building, recorded his deed, and then ascertained that there were lienable claims against the building for lumber and materials. He found that no liens had been filed, though the time for filing had not expired. Tractor Conn had the owner arrested for obtaining money under false pretenses.

"No liens had actually been filed so there was nothing against the property outside of the mortgage at the time I sold it to you," was Adams' defense, but the Minnesota Supreme Court ruled against him.

"The former owner says that the right of the lienholder is merely an inchoate right which the claimant may assert or which he may not assert, and, whether or not it is claimed depends wholly upon the will or whim of the person having the inchoate right. We think it more than that," said the Minnesota Supreme Court in the case of *the State vs Anderson*, 199 Northwestern Reporter 6.



**More Legal Adventures of
Tractor Conn Next Month**

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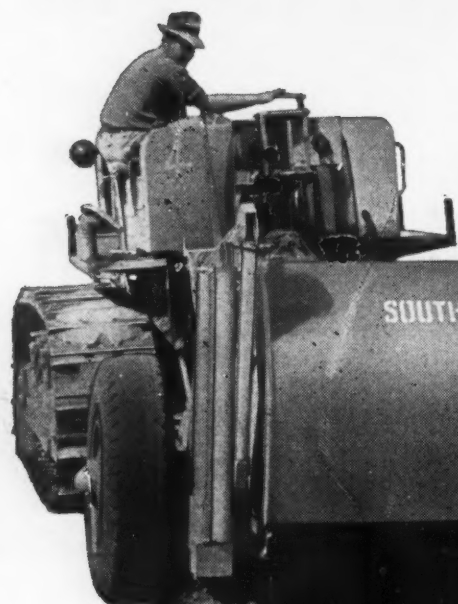
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construction to handle tough jobs easily. Ideal for road maintenance and repair.



Four page bulletin available on request. Gives engineering data on the three standard sizes of Southwest Hauling Scoops. Write Department A130 Southwest Welding & Manufacturing Company, Alhambra, California.

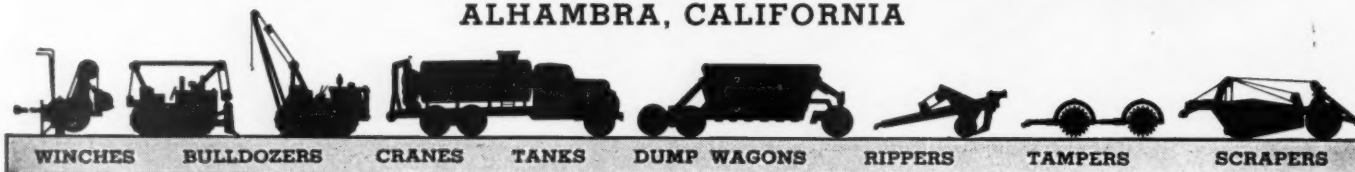


The Southwest Single Cable Control Scoop can be operated by a single drum or as a "dozer scoop" combination with double drum unit.

CONSTRUCTION MACHINERY DIVISION

Southwest Welding & Manufacturing Co.

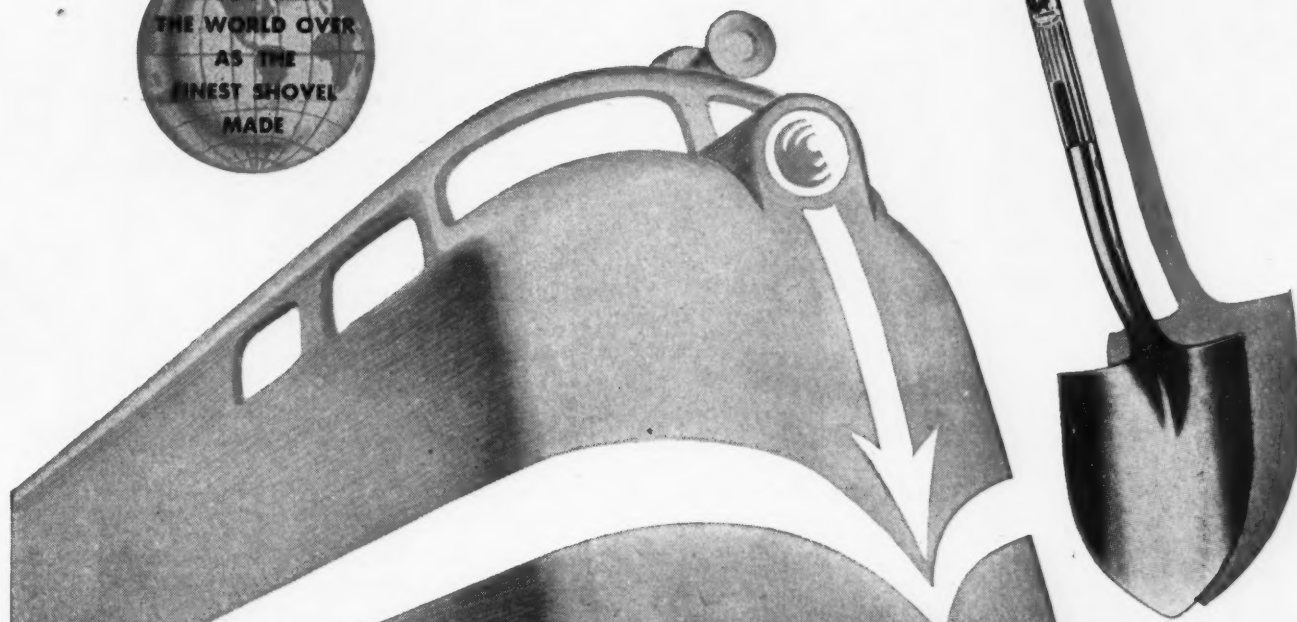
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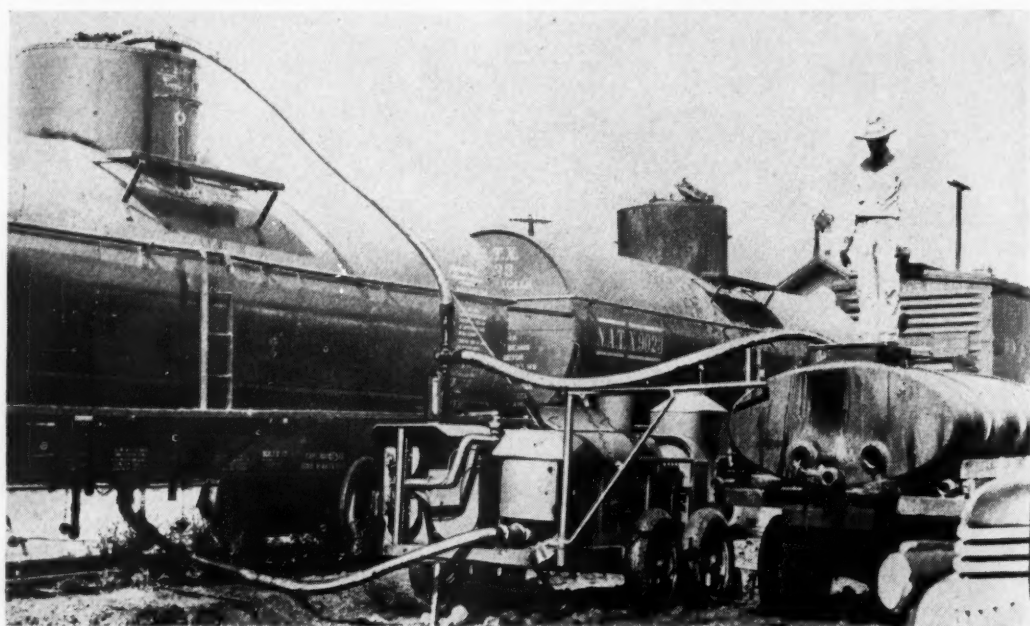
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CONSTRUCTION EQUIPMENT NEWS

OCTOBER, 1945 REVIEW of Construction Machinery and Materials



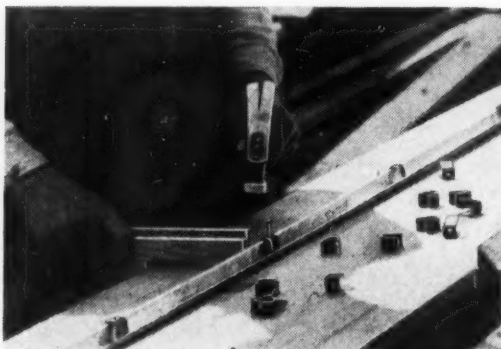
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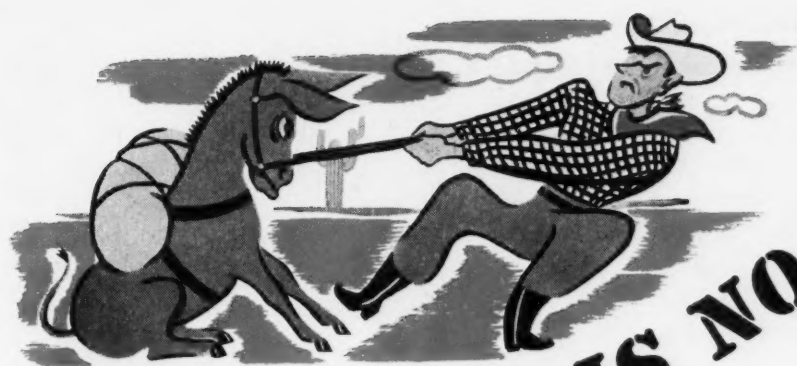
vents burning or overheating of asphalt. Built-in steam generator for thawing cars that are too cold to be pumped is optional. Heater is furnished in either trailer or truck mounting.—**W. E. Grace Mfg. Co., Dallas 1, Tex.**



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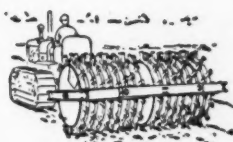
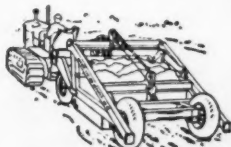
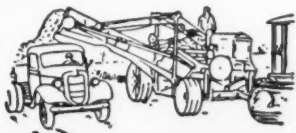
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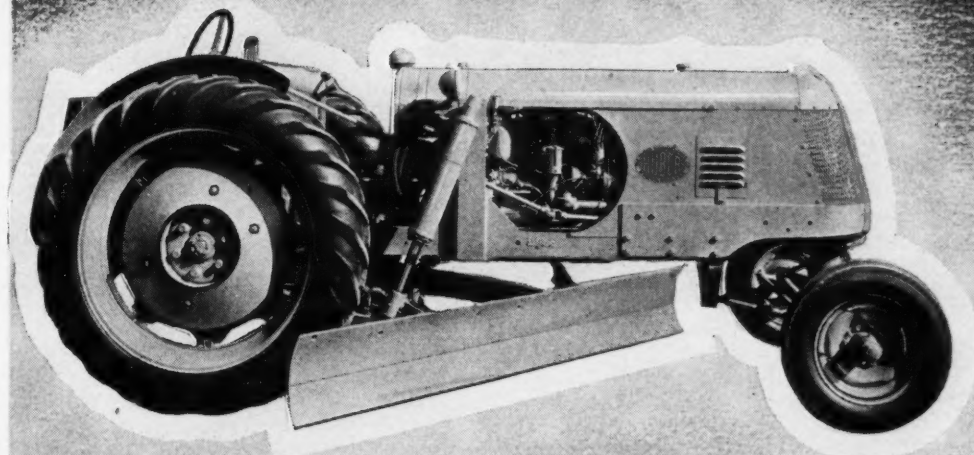
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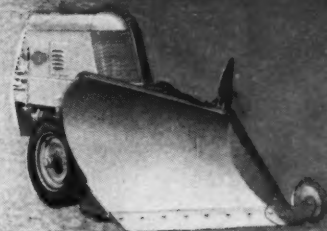
Versatile's THE WORD FOR THE **HUBER MAINTAINER**



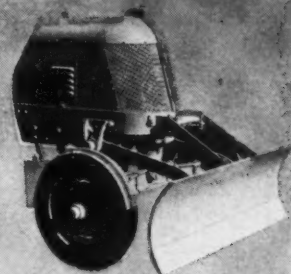
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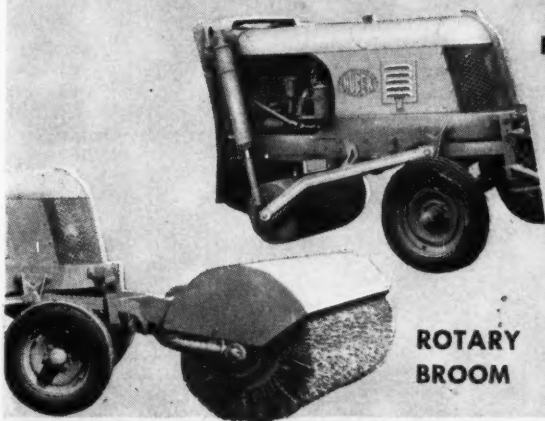
ONE WAY
SNOW PLOW



V TYPE
SNOW PLOW

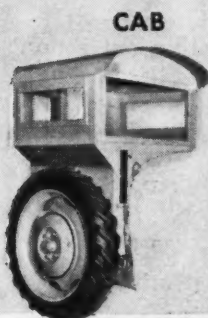


BULLDOZER

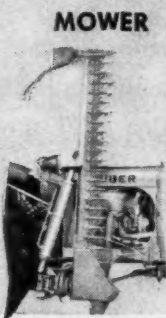


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idential sewer job.*



WHEN you've got to work at top speed to keep ahead of fast-moving schedules, you appreciate the extra mobility of Le Roi compressors — and the dependable qualities built into every one.

Foremost among many features is the coordinated action between engine and compressor, eliminating costly vibration and resulting in greater efficiency. Because both engine and compressor are built to the precision standards of an engine builder, you get greater smoothness that results in longer life — controlled speed that is economical, yet keeps a constant supply of air on hand — and dependable performance that pays off in service and satisfaction. 60 to 315 c.f.m.—gasoline-powered and 105 to 500 c.f.m. Diesel-powered.

See your nearby Le Roi distributor or write for bulletins.

C-71

Le Roi Company

1712 S. 68th STREET • MILWAUKEE 14, WISCONSIN

Distributors Located in Principal Cities



AUTOMATIC CENTRIFUGAL PUMPS in sizes from 1½ to 6 in. are now available for post-war uses and feature the following construction advantages: (1) Positive high speed automatic prime with no moving parts in pump mechanism; (2) precision ground, polished and case hardened positive water seal; (3) direct-in-line suction flow—water detours



eliminated and friction loss cut; (4) non-clogging impeller with smooth operation and maximum water and solid handling; (5) modern design provides simple, sure, low-cost impeller adjustment; (6) scientifically designed, rugged construction Volute eliminates angular corners and assures trouble-free operation; (7) rigid factory testing for capacities, tolerances, alignment and engine performance. Two-color synthetic enamel finish.—**Barnes Manufacturing Co., Mansfield, Ohio.**

★ ★ ★

FULL-CIRCLE POWER SHOVEL has specially engineered heavy-duty lower chassis which provides mobility, four-wheel drive traction and steering under control of same man who operates unit as shovel or crane. Short-coupled lower chassis permits 360-deg. shovel operation. Overall width of



chassis is 8 ft. and wheel base is 9 ft. Timken Detroit axles, Ross steering gear unit and Vickers hydraulic ram to augment hand steering control are employed. All inclosed gears have forced oil lubrication and "Airtflex" clutches replace conventional live-end-dead-end clutches.—**The Byers Machine Co., Ravenna, Ohio.**



Big, Tough Jobs

WILLIAMS "SUPERECTOR"

● This rugged, reversible ratchet wrench is designed for speed and power. Quadruple pawls, rather than a single pawl, combine with a drop-forged handle to give it unbelievable strength. Twenty teeth on all sockets—both hex and square—permit complete rotation of nuts with only 18° handle swing. Made in five brawny sizes up to 53" long, accommodating sockets with openings from 1" to 4-5/8". Sold by Industrial Distributors everywhere. J. H. Williams & Co., Buffalo 7, N. Y.



WILLIAMS
DROP-FORGINGS AND
DROP-FORGED TOOLS

IT DIDN'T TAKE A WAR...



IT DIDN'T TAKE A WAR to establish world wide acceptance of "HERCULES" (Red Strand) Wire Rope . . . Its high tensile strength *plus* exceptional ability to withstand wear and fatigue, has long been recognized throughout the world.

There is a correct type and construction of "HERCULES" (Red Strand) Wire Rope for every heavy duty purpose, and its far flung use is due to its unwavering ability to give safe, dependable and economical service *anywhere* — on any job!

Feel free, always, to consult our Engineering Department on the use, care and application of wire rope.



MADE ONLY BY
A. LESCHEN & SONS ROPE CO.

WIRE ROPE MAKERS
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ESTABLISHED 1857
ST. LOUIS, MISSOURI, U. S. A.

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PORTLAND 914 N. W. 14th Avenue
SEATTLE 3410 First Avenue South

HEIL Hi-Speed Cable Scrapers

**dig capacity loads..
faster..easier..with-
out voids or waste**



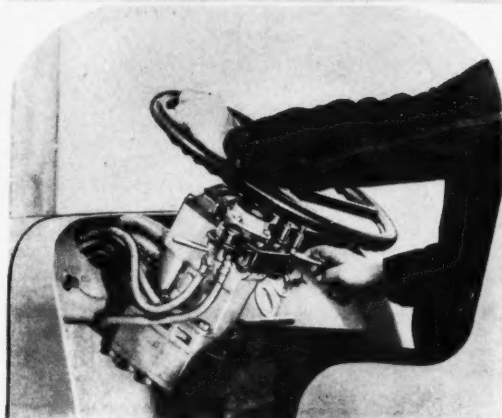
Correct Bowl Design

The size and shape of the bowl and front gate, plus the top forward slope of the back sheet, permits excellent boiling action.



... conforms with natural boiling action

The dirt has a tendency to boil into a mound-like load. The Heil bowl fits the load—without extra digging time or spillage due to forcing dirt into empty pockets at the rear.



Power-steer short-radius turn

Even in heavy going and over rough construction roads, the Heil Hi-Speed Tractor steers with the ease of the conventional passenger car. An engine-driven hydraulic pump furnishes steering power controlled by the steering head. The wheel is merely the hydraulic control-valve lever for the power steer. In addition, it can be operated manually to provide ample steering control in case of failure of the power system. Powerful in action, simple and reliable, this exclusive Hydro-power steer saves time and cuts driver fatigue.

R 53

Because of its scientifically designed bowl and correctly pitched cutting blade, the famous Heil Hi-Speed Cable Dozer digs bigger payloads easier and faster. The bowl design conforms with the natural boiling action, forcing dirt into the entire bowl area without voids or waste. In addition, the rapid raising and lowering of the cutting bit, made possible by the fulcrum-type lift, forces all loose soil into the bowl—saving many valuable minutes out of each working hour.

Push-loaded with a crawler tractor, this unit digs a heaped 15-yard load in 40 to 50 seconds and speeds away to the fill at speeds up to 20 m.p.h.—to help you move more yardage, faster and cheaper. For further details—

See your Heil Distributor



THE HEIL CO.

GENERAL OFFICES • MILWAUKEE 1, WISCONSIN

TESTED...

BYERS MODEL 61

1/2 YD. POWER SHOVEL

**... With New Improved
Money Making Features
for Excavating and Material Handling Contractors**

Here's an excavator you can depend on to give you new high powered performance, speedy operation, ease of control and flexibility . . . in fact, it was designed for *today's* excavating and material handling requirements.

In long, gruelling *tests* on contractors' jobs, under contractors' supervision, it *proved* the value of its performance, speed, control and flexibility. It has contractors' *approval*. With Byers Model 61 on any half yard job, you can compete.

FEATURES: Sturdy unit welded rolled steel frames. Powerful 60 H. P. motor with all accessories. Gears enclosed and operating in circulating oil bath. Anti-friction bearings

throughout. Airflex self-aligning, non-adjusting, long-lived clutches. Air brakes. New easy finger tip control. Independent operations. Convertible to all attachments.

For complete information see your nearest Byers distributor or write for new illustrated catalog.

THE BYERS MACHINE CO., RAVENNA, OHIO

Distributors throughout the world

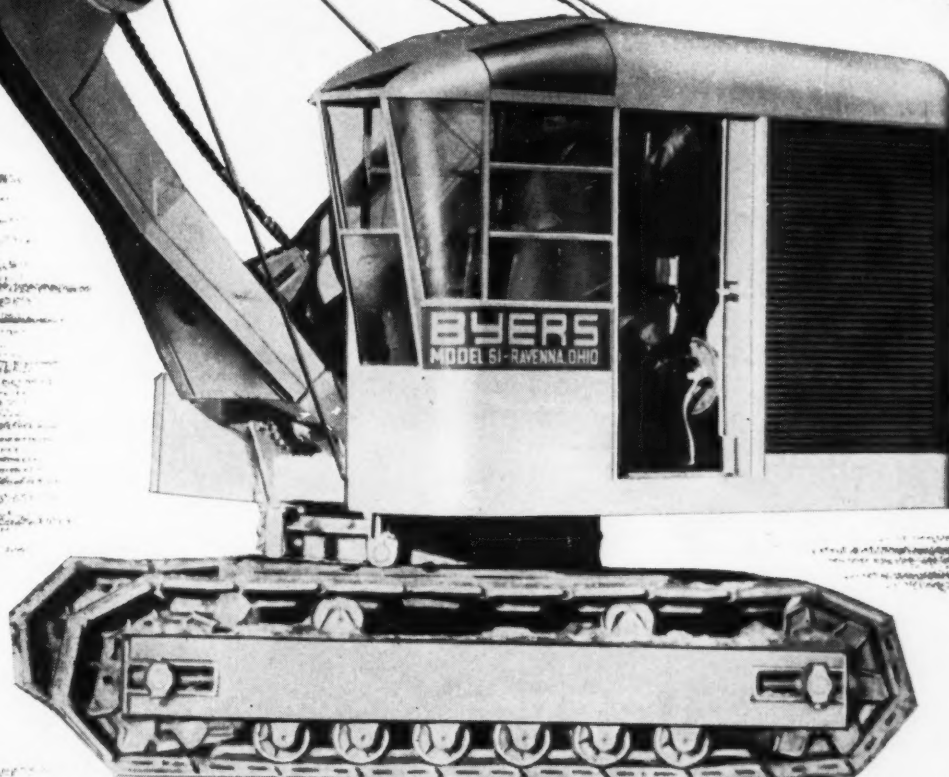
BYERS

Proved...

APPROVED!

ENGINEERED WITH ALL
THE FEATURES OF BYERS
TRAVELER EXCEPT MOBILE
RUBBER TIRE CHASSIS

This half yard excavator is built similar to Byers Traveler and offers you all the engineering advantages contained in the upper deck construction of Byers Traveler. All attachments are interchangeable with the Traveler. Model 61 is offered for contractors who prefer a crawler base rather than a mobile, self-propelled chassis.



1/2 YD. MODEL 61

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for immediate Delivery

**CONVEYOR, ELEVATOR and
TRANSMISSION BELTING**
all widths and plies

V-BELTS all sizes

HOSE
all sizes and types

AIR	DISCHARGE	STEAM
FUEL	COMPRESSOR	VACUUM
FIRE	PILE DRIVERS	SUCTION
WATER	ROAD BUILDERS	WELDING

**BOOTS, DREDGE SLEEVES,
PUMP DIAPHRAGMS, ETC.**

**... and everything rubber
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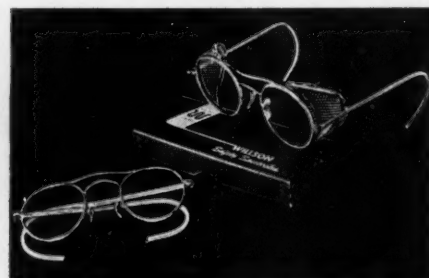
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CO., Inc.**

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Phone: BArlay 7-9793

SAFETY SPECTACLES are available in 20 frame sizes so any face type can be well fitted. Plastic rocker nose pads are self-adjusting to size of bridge and adjustable cable temples add to com-



fort. Super-tough lenses, which may be ground to prescription if desired, are heat treated. Every lens is individually tested for impact strength and optical clarity and frame is reinforced. Available in clear or Willsonite green glass with or without variety of 10 types of side shields in clear or green plastic, wire mesh or leather.—Wilson Products, Inc., Reading, Pa.



SUPER POWER TRUCKS equipped with heavy-duty vacuum pumps were exported to Russia by Vacuum Concrete, Inc., for use in rebuilding Dniepropetrovsk Dam. Trucks are model WA-22.—White Motor Co., 842 E. 79th St., Cleveland 3, Ohio.



Horizontal Pile Hammer

(Continued from page 85)

into the coupling of the preceding rod with the aid of chain tongs and 3-ft. and 4-ft. stillson wrenches.

Controlling Path of Rod

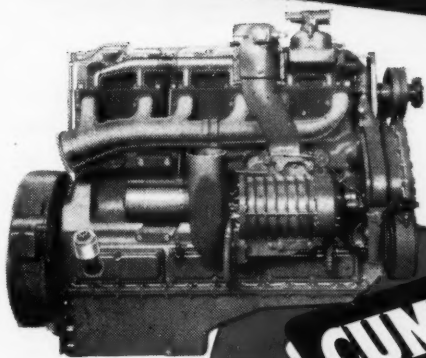
It was essential for the success of the work that each tierod should follow as nearly as possible a horizontal path in

(Continued on page 126)

POWERED FOR ^{higher} PROFIT

Consider these advantages in standardizing on Cummins Dependable Diesels for your heavy-duty power requirements—automotive, portable or stationary. Three models—150, 200 and 275 hp—have the same basic design and practically the same mounting dimensions . . . weights as low as 10½ pounds per horsepower . . . many interchangeable parts . . . a single service procedure. Results: in effect, you meet varying power needs with "one engine" . . . you save engine weight and space . . . you reduce parts inventory . . . you simplify the mechanic's job, cut service costs.

CUMMINS ENGINE COMPANY, INC., Columbus, Indiana



Read the Record

CUMMINS
Dependable
DIESELS



SINCE 1919...PIONEER OF PROFITABLE POWER
THROUGH HIGH SPEED DIESELS

1. Most of the rubber-tired earth and ore-moving equipment on the Mesabi Iron Range—the world's largest—is Cummins Diesel-powered.
2. More than 90% of the long-line, franchise-operated, heavy-duty, diesel-driven trucks in the 11 Western States are Cummins Diesel-powered.
3. In the world's greatest petroleum producing area—the Mid-Continent region—Cummins Diesels outnumber any other make of diesel engine.
4. More yarders, loaders and trucks in the Northwest Woods are powered by Cummins Diesels than by any other diesel.

DAVEY AUTO-AIR LEADS ON COMPRESSED AIR JOBS REQUIRING MOBILITY



WAR has taught America the value of mobility both on the fighting front and on the home front. The great value of self-contained units that can get to the job, do it, then get quickly on to another job is becoming fully recognized in every field. The Davey Air-Aristocrat—the famous portable compressed-air unit mounted on a trailer—has its place on day-in and day-out construction jobs.

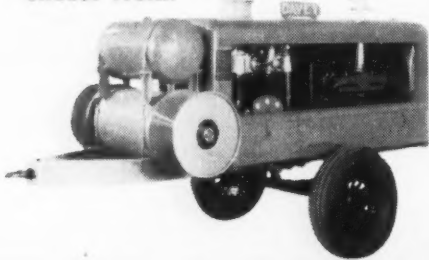
But on the short jobs, where maximum mobility means greatest efficiency, the Davey truck-mounted Auto-Air has no competition. The Davey Auto-Air is powered by the truck engine . . . through the Davey H. D. Power Take-Off . . . and is mounted behind the cab . . . uses less than one-third of the chassis space. Besides the compressor, the truck has plenty of room for men, tools and materials. The Davey Auto-Air gets to the job fast, does the job right, does the job cheaper, can do more jobs per day. It is lower in first cost and more economical to operate and maintain, because one engine runs both the truck and the compressor.

Truck-engine-driven compressors, electric welders and flood lights . . . single or combination units . . . are available. Davey Auto-Air Compressors are available in 60, 105, 160, 210 and 315 cfm capacities.

Davey Air-Aristocrats for Continuous Service

Davey portable compressors offer uninterrupted service at lower ultimate cost for the jobs that require air for days or weeks. Davey Air-Aristocrats are built for any type construction job, and for maximum efficiency in any climate.

Available in 60, 105, 160, 210 and 315 cfm capacities . . . direct driven . . . gasoline or Diesel powered . . . five mountings to choose from.



You are invited to write for a copy of the free Davey Catalog E-172, which gives full information on Davey Compressors, Truck Power Take-Offs and Pneumatic Saws, plus other pneumatic engineering data. This catalog is of special interest to engineers, builders and contractors.

D-145-6

DAVEY Compressor Co.
KENT · OHIO

DEALERS IN PRINCIPAL CITIES



(Continued from page 124)

its passage through the 100-ft. width of fill, so that it would "hole through" at proper line and grade within the specified area of a 2-ft.-dia. target at the deadmen. In the preliminary stages of the work it developed that rods equipped with a conical driving point had a tendency to dip downward considerably below specified grade at the far end where they were to be anchored to steel H-pile deadmen.

Guiding Rod

To correct this trouble, many schemes were tried, such as wedge points, fins, or stabilizers, on the bottom of the rod, but what would work with one rod would not necessarily work with the next, there being no absolute consistency to the ground, subject as it was to tidal fluctuations. In some places holes could be dug at spots along the length of the driven rod, to test and give the rod an upward or downward direction, but generally the site was so occupied by the launching ways, shores and supports for the ship being built, that it was not possible to dig test holes and the rod would have to be

(Continued on page 132)

STEAM
CLEANS FASTER

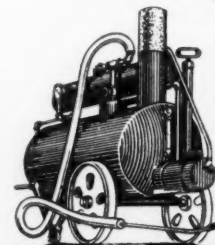
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PORTABLE-OIL BURNING
STEAM CLEANER

Saves Man Hours!

Cuts Repair Time!

Your repair shop or maintenance department can save many precious man-hours using the low cost, portable Siebring Steam Cleaner. In-

stant steam cleans faster and cuts repair time. It's automatic, burns fuel oil, natural or artificial gas. Its low cost will surprise you.



- Portable, easy to move.
- Sturdy construction.
- Safe to use.

WRITE FOR FOLDER

Write today for complete and illustrated descriptive material on this remarkable steam cleaner. Address your inquiry to Dept. 700.

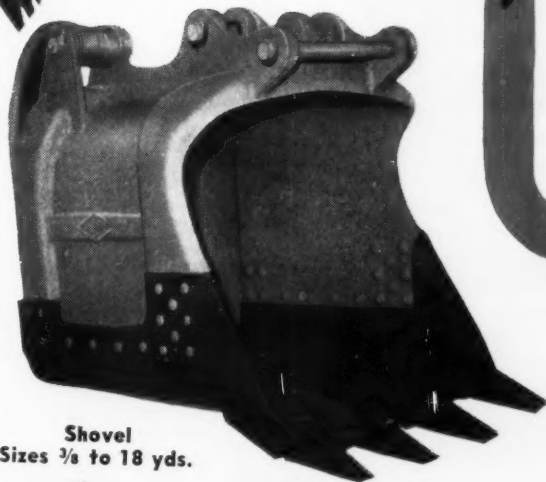
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You risk nothing. Sold on 10 day FREE TRIAL basis. Write for full details.

SIEBRING MANUFACTURING CO.-GEORGE, IOWA

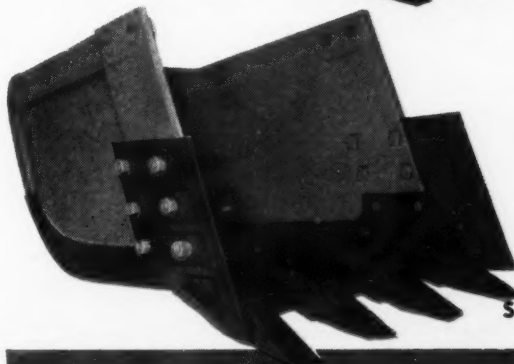
America's most complete line
of material handling buckets.



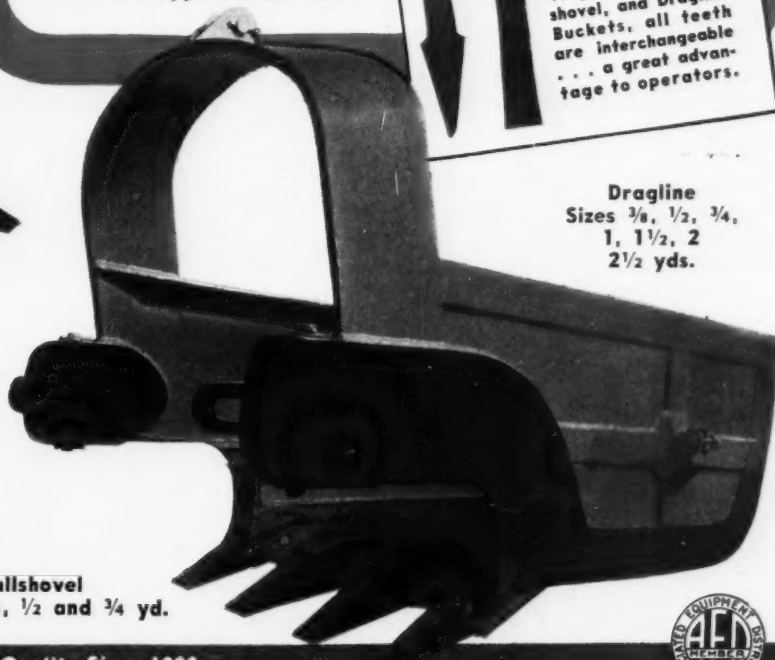
Clamshell
Sizes $\frac{3}{8}$ to 2 yds.



Shovel
Sizes $\frac{3}{8}$ to 18 yds.



Pullshovel
Sizes $\frac{3}{8}$, $\frac{1}{2}$ and $\frac{3}{4}$ yd.



Dragline
Sizes $\frac{3}{8}$, $\frac{1}{2}$, $\frac{3}{4}$,
1, $1\frac{1}{2}$, 2
 $2\frac{1}{2}$ yds.

WE BUILD ALL

4

MATERIAL HANDLING BUCKETS



ALL PURPOSE

- SHOVEL
- PULLSHOVEL
- DRAGLINE
- CLAMSHELL

We build a wider and more complete line of material handling buckets than any other manufacturer. Volume production methods enable us to build a better bucket with amazing economies in manufacturing.

FRONTS, BOTTOMS, SCOOPS, and teeth, shown in red on buckets, are 14% manganese steel developing up to 120,000 tensile p.s.i. for long service life and hard abuse.

Experience Counts

See your shovel engineer or equipment dealer about PMCO Dippers and Buckets.



On the $\frac{1}{2}$ yd. and $\frac{3}{4}$ yd. Shovel, Pullshovel, and Dragline Buckets, all teeth are interchangeable . . . a great advantage to operators.

Quality Since 1880

PETTIBONE MULLIKEN CORP.

CHICAGO 51,
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WE OPERATE THE LARGEST AND MOST COMPLETE MANGANESE STEEL FOUNDRY IN THE UNITED STATES.



**MORE MODELS IN PRODUCTION . . .
1,000 A DAY COMING!**



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Trucks because there
are **MORE FORD*
TRUCKS to SEE!**

100 H.P. V-8  90 H.P. SIX

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**YEAR AFTER YEAR, OFFICIAL REGISTRATIONS SHOW MORE FORD
TRUCKS ON THE ROAD—ON MORE JOBS—FOR MORE GOOD REASONS**

**32 GOOD REASONS WHY
TODAY'S NEW FORD TRUCKS
ARE THE GREATEST IN
FORD HISTORY**

THE ENGINE

1. New aluminum alloy cam-ground pistons with 4 rings each—for improved oil control.
2. New steel-cored SILVALOY connecting rod bearings—provide $2\frac{1}{2}$ to 3 times longer life.
3. Larger capacity oil pump—for improved lubrication and longer bearing life.
4. Rear main bearing oil seal—for added oil economy.
5. Oil filter, renewable cartridge type—to keep oil clean and reduce wear.
6. Removable plate at bottom of oil pan—for easy access to clean oil pump screen.
7. Balanced carburetion—for increased economy and efficiency.
8. Latest type self-washing oil bath air cleaner—keeps out destructive dirt, thus greatly prolonging engine life.
9. Thermostatically controlled exhaust by-pass valve regulates intake manifold temperature—for better fuel vaporization and economy.
10. Intake manifold—improved design for easy vacuum line connections.
11. New sealed-dry, V-outlet distributor—water-sealed, short-proof, air-cooled, trouble-free—streamline-molded of dielectric bakelite, with neoprene-coated high-tension leads protected by heavy ozone-resistant plastic jackets.
12. New aluminum timing gear—for longer life and silent operation.
13. Valve springs shot-blasted and rust-proofed—for longer life.
14. New stronger piston pins—for longer life.
15. New design interchangeable cylinder heads—for simpler, lower cost servicing.
16. More efficient exhaust valve cooling—for longer valve and cylinder block life.
17. High-efficiency fan—for better cooling.
18. Pressure-valve radiator cap—to prevent loss of coolant and improve engine operating efficiency.
19. New bronze thrust washer in water pumps—to prevent leaks and give longer life.
20. Oil-resistant synthetic rubber engine mounts with new design front cups—for longer life.
21. Oil pan divided at clutch housing—provides easier clutch servicing.

THE CHASSIS

22. Larger clutch in Tonner truck. 44.7% increase in friction area—for longer life.
23. Four-speed transmission now standard in Tonner—for more efficient operation and longer life.
24. Four-speed transmission, internal spring reverse lock—eliminates latch on shift lever.
25. New-design transmission main shaft splines—to provide positive gear mesh under load.
26. Thrust washers added at ends of four-speed transmission countershaft gear—for longer life.
27. Larger tires now standard on all chassis—to obtain maximum life from present-production tires.
28. Wheel rims uniform wide-base on each model—for better tire life and simplified servicing.
29. Two-speed axle vacuum shift—for easier control and elimination of separate shift lever.
30. Additional sill cross-member at rear of cab—for greater stability and longer cab life.
31. Cab door window glass mounted in metal frame—for greater strength to prevent glass breakage.
32. Larger, adjustable-arm rear-view mirror—for increased visibility and safety.

**"mileage means
money
to us!"**



M. L. ADLEY, Treas.
Adley Express Co.
New Haven, Conn.

● "Our East Coast operation of 400 highway carriers traveling over 500,000 miles per month and hauling some 12 million pounds per week, requires careful estimating and cost accounting. For the past 25 years our records proved Armstrong Tires are economical and dependable. I am now looking forward to an even better Armstrong Tire to aid us in reducing operating costs . . . mileage means money to us."



SINCE 1912 hundreds of commercial car operators have learned that *you can't buy a better tire than an Armstrong!* For years, we have pioneered in making tires that wear longer and cost less. You can count on an Armstrong to give you a tire that will perform better, last longer, stand up under all conditions and cost you less per mile of use! That's not a statement—it's a promise, a promise backed by the thirty-year integrity of the manufacturer.



For literature or information write your Armstrong distributor or to Armstrong Rubber Company.

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Manufacturers of Quality Tires and Tubes Since 1912 • General Offices and Plant—460 Elm Street, West Haven 16, Conn.

Osgood

PROVED IN SERVICE

9-Year-Old Osgood Shovel Brings Top Price in Surplus Equipment Sale

Even after it had gone through nine years of grueling service, this Osgood shovel looked good to the experienced construction machinery dealers who were bidding on it. Every one of the bidders was banking on the stamina built into every Osgood machine . . . they knew that there still were years of service left in this veteran.

That's what engineered design and precision manufacture means—long-lived, dependable, trouble-free service. It's an important fact to keep in mind when you're selecting your new equipment for postwar projects. We'll be glad to send complete information on the complete line of Osgood construction, excavating and materials handling equipment . . . to tell you how and why Osgoods will stay on the job, day after day, turning in better performance records at lower cost.

THE RECORD

Manufactured in 1936, this 1½ yard Osgood shovel had already turned in nine years of faithful service when it was offered at a recent surplus equipment sale. The bidders, experienced construction and excavating machinery dealers, knew the machine had been in service on the Alcan highway project for nearly two years; working under the most adverse conditions, with only sketchy provisions for maintenance. This Osgood, nine years old and offered "as is," brought the highest price of any of the 1189 pieces of equipment in the sale!

THE MACHINE



THE
GENERAL
EXCAVATOR COMPANY
CRANES, DRAGLINES
AND SHOVELS
DIESEL, GAS, ELECTRIC

Associated with The General Excavator Company

OSGOOD
THE OSGOOD COMPANY • MARION, OHIO

ARMY
NAVY
OSGOOD
SHOVELS, DRAGLINES
CRANES



Sargent
Overhead
ACTION IS
FAST . . .
.. DIRECT ..
POWERFUL

THAT'S why the Sargent Overhead is outstanding as a tractor loader . . . The full power of the crawler rams the bucket into the bank of material . . . It reverses its own length in a straight-line while the bucket swings easily and fast overhead . . . And the load is dumped gently in any selected spot in the truck.

With this Sargent Overhead straight-line action there is never any twisting and turning to ruin the tractor running gear . . . With straight-line action it's a cinch to dig up and load hard street surfacing . . . When loading snow or from a stock pile or gravel bank the Overhead will load a truck in two minutes.

Straight-line action and the Overhead principle allow fast loading in narrow places,—in tunnels, between buildings and along country roads . . .

The Sargent Overhead is a rugged and tough, fast worker . . . Like the bull in our illustration above the Overhead doesn't meander around a meadow when it has a job of work to do . . . it moves fast and powerfully in a straight-line.



FOR DETAILS SEE YOUR OLIVER "CLETRAC" DEALER

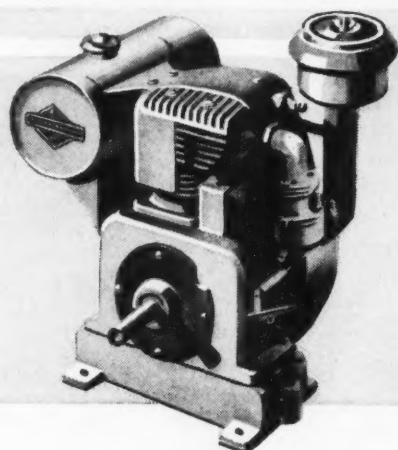
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MAINE STEEL, INC.

SOUTH PORTLAND

MAINE

BRIGGS & STRATTON ENGINES NOW ON THEIR WAY BACK TO YOU !



BACKED by an outstanding record of valiant service in scores of standard and special wartime applications, Briggs & Stratton 4-cycle gasoline engines have returned to peacetime activities. With greatly expanded facilities for precision manufacture, we are now producing more and more quick-starting, dependable, trouble-free, Briggs & Stratton gasoline engines in a full range of sizes and models — recognized the world over as the preferred "air-cooled power".

BRIGGS & STRATTON CORPORATION
Milwaukee 1, Wis., U. S. A.

Air-Cooled Power



(Continued from page 126)

pulled out several times, in many instances, and redriven until it came out in the specified area. It is probable that old timber and rocks in the filled ground also helped to deflect the rods.

The best method of guiding seemed to be a horizontal fin or stabilizer 6 in. wide and 3 ft. long welded to the top of the driving end of the first rod in each string. This stabilizer provided horizontal bearing area for the front end of the rod and prevented it from dipping downward during its horizontal passage through the fill. Another precaution was taken to prevent the long jointed string of heavy rods from dipping below the desired path of travel during driving; it consisted in setting the leads, in which the steam pile hammer operated, at a slope of 6 in. in 100 ft. so as to direct the initial travel of each tierod upward from a true horizontal path.

As the rods were driven it was obviously necessary to maintain the stabilizing fin at the forward end of the string in a true horizontal plane. When the first section of rod was properly lined up, and before its point passed the face of the bulkhead, a series of chalk lines were marked on the top of the rod throughout its length. Then, as driving started, a worker with a pipe wrench watched these chalk marks carefully and if the rod showed a tendency to revolve he turned it with his wrench so as to bring the chalk lines on top and thus insure the horizontal position of the stabilizing fin.

H-Pile Deadmen

The inshore end of each long horizontal steel tierod is anchored to a deadman, consisting of two pairs of Bethlehem steel H-piles, located just beyond the side of the shipway. Spaced 2 ft. 9 in. apart on centers the pairs of H-piles straddle the tierod, as shown in one of the drawings. Each pair consists of a 12-in., 74-lb.-per-ft. pile driven vertically and a 14-in., 73-lb.-per-ft. pile driven at a batter of 30 deg., thus providing a very strong reaction to the horizontal pull of the tierods. Each 14-in. batter pile was driven first and then, after a portion of its web at the top had been cut away by an oxy-acetylene torch, the 12-in. vertical pile was driven to telescope between its flanges. The junction of the tops of the two piles was then welded to form a strong, interlocked joint. The apex of the pairs of piles forming each deadman was capped with a 5x3x3-ft. block of reinforced concrete, using Incor high-early-strength cement, through the center of which the tierod was located in a 4-in. pipe sleeve. On the face of the concrete block an 18x18x2-in. bearing plate or washer was placed over the rod and a

(Continued on page 136)

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If you have anything to do with metals, this 40-page, illustrated booklet is just what you need.

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Yes, we want to cut our Rust losses. Send—without any obligation on our part—a copy of your new 40-page booklet on Rust prevention.

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Company _____

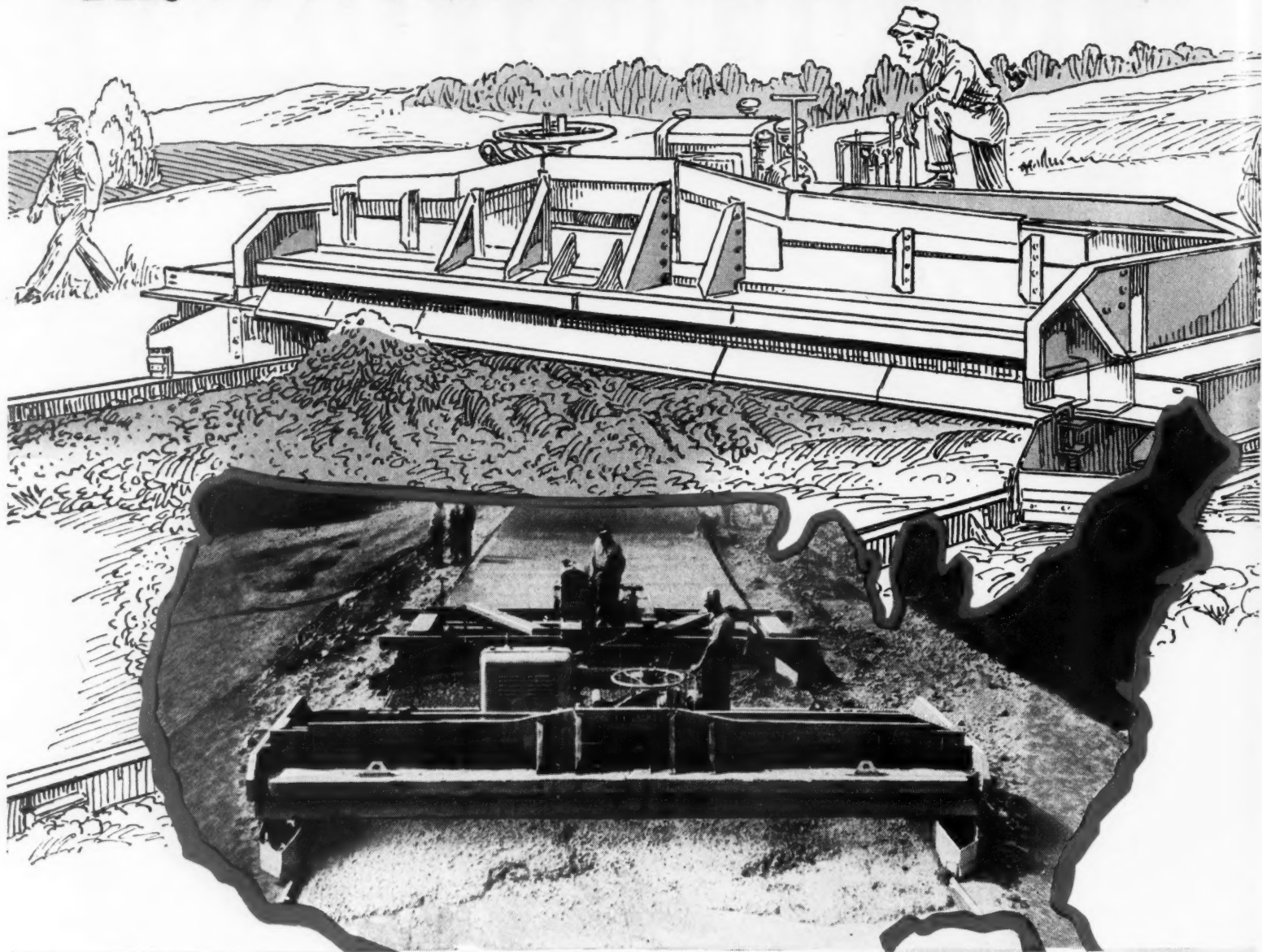
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City _____ State _____



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Phoenix — State Tractor Equipment Co.

ARKANSAS

Little Rock — Lyons Machinery Company

CALIFORNIA

Los Angeles — Le Roi-Rix Machinery Co.

San Francisco — C. H. Grant Company

COLORADO

Denver — Ray Corson Machinery Co.

CONNECTICUT

New Haven — W. I. Clark Co.

DELAWARE

Philadelphia, Pa. — Giles & Ransome

DISTRICT OF COLUMBIA

Washington — Matt A. Doetsch Mach. Co.

FLORIDA

Jacksonville — Florida Equipment Co.

Miami — Florida Equipment Company

Tampa — Florida Equipment Company

GEORGIA

Atlanta — W. C. Caye & Company

IDaho

Boise — Intermountain Equip. Co.

ILLINOIS

Chicago — O. T. Christerson Co.

St. Louis, Mo. — O. B. Avery Company

INDIANA

Indianapolis — Reid Holcomb Co.

Chicago, Ill. — O. T. Christerson Co.

Louisville, Ky. — Brandeis Mach. & Supply Co.

IOWA

Davenport — Gierke-Robinson Co.

Des Moines — Herman M. Brown Co.

KANSAS

Kansas City — B. W. Van Keppel Co.

KENTUCKY

Louisville — Brandeis Mach. & Supply Co.

LOUISIANA

New Orleans — Southern States Equip. Co.

MAINE

Portland — Stanley-Cadigan Company

MARYLAND

Baltimore — Henry H. Meyer Co., Inc.

MASSACHUSETTS

Boston — The Equipment Company

New Haven, Conn. — W. I. Clark Co.

MICHIGAN

Detroit — Wm. P. Favorite Company

Grand Rapids — Contractors Mach. Co.

Iron Mountain — Service & Supply

Division of Lakeshore Engineering Co.

MINNESOTA

Duluth — Borchert-Ingersoll, Inc.

St. Paul — Borchert-Ingersoll, Inc.

MISSISSIPPI

Amory — Dalrymple Equip. Co.

New Orleans, La. — Southern States Equip. Co.

MISSOURI

Kansas City — G. W. Van Keppel Co.

St. Louis — O. B. Avery Company

MONTANA

Billings — Western Const. Equip. Co.

NEBRASKA

Omaha — Anderson Equipment Co.

NEVADA

Los Angeles, Cal. — E. M. Ornitz & Co.

San Francisco, Cal. — C. H. Grant Co.

NEW HAMPSHIRE

Barre, Vt. — Cassellini-Venable Corp.

Boston, Mass. — The Equipment Co.

Portland, Me. — Stanley-Cadigan Co.

NEW JERSEY

New York, N. Y. — R. E. Brooks Company

Philadelphia, Pa. — Giles & Ransome

NEW MEXICO

Albuquerque — Lively Equipment Co.

NEW YORK

Albany — Larkin Equipment Co.

Buffalo — Trevor Corporation

Elmira — LeValley, McLeod & Kinkaid

Endicott — Newing Motors Co., Inc.

New York — R. E. Brooks Company

Rochester — Keystone Builders Supply

Syracuse — Syracuse Lumber Co.

Utica — McQuade & Bannigan, Inc.

NORTH CAROLINA

Raleigh — Carolina Tractor & Equip. Co.

Salisbury — Carolina Tractor & Equip. Co.

OHIO

Cincinnati — Rish Equipment Co.

Cleveland — H. B. Fuller Equipment Co.

OKLAHOMA

Oklahoma City — Leland Equipment Co.

Tulsa — Leland Equipment Co.

OREGON

Portland — Contractors Equipment Corp.

PENNSYLVANIA

Philadelphia — Giles & Ransome

Pittsburgh — Dravo Doyle Company

RHODE ISLAND

Boston, Mass. — The Equipment Co.

SOUTH CAROLINA

Columbia — Jeff Hunt Road Machinery Co.

SOUTH DAKOTA

Rapid City — J. D. Evans Equip. Co.

TENNESSEE

Chattanooga — Nixon-Hasselle Co.

Knoxville — Wilson-Weesner-Wilkinson Co.

Nashville — Wilson-Weesner-Wilkinson Co.

Memphis — Road Bldrs. Equip. Co.

TEXAS

Dallas — Conley-Lott-Nichols Mach. Co.

Houston — R. B. Everett & Co.

San Antonio — Acme Wire and Iron Co.

UTAH

Salt Lake City — C. H. Jones Co.

VERMONT

Barre — Cassellini-Venable Corp.

VIRGINIA

Richmond — Rish Equipment Co.

Roanoke — Rish Equipment Co.

WASHINGTON

Seattle — Star Machinery Co.

Spokane — Intermountain Equip. Co.

WEST VIRGINIA

Charleston — Rish Equipment Co.

Clarksburg — Rish Equipment Co.

WISCONSIN

Milwaukee — Hunter Tractor & Mach. Co.

WYOMING

Billings, Mont. — Western Const. Equip. Co.

Denver, Colo. — Ray Corson Mch. Co.

ALASKA

Seattle, Wash. — Northern Commercial Co.

CANADA

Montreal — Watson Jack & Co., Ltd.

Toronto — W. L. Ballentine Co.

Vancouver, B. C. — B. C. Equip. Co., Ltd.

Winnipeg — Kane Tractor & Equip. Co.

Saskatoon — Richardson Road Mach. Co.

NEWFOUNDLAND

St. John's — Dominion Distributors Co.

to Paving Equipment in 25 Years

The Blaw-Knox CONCRETE SPREADER Automatic Transverse Blade Type *FAST-EFFICIENT-ECONOMICAL*

Here is the complete mechanical solution to the problem of spreading dry, harsh concrete mixes in large volumes at high speed. The Blaw-Knox Concrete Paving Spreader, first used on the Pennsylvania Turnpike in 1940, has proved itself indispensable to contractors for high production, low-cost paving work all over this country as well as abroad. It spreads concrete uniformly and accurately. With the pavement vibrator added, this one-man operated machine spreads and consolidates the concrete in a manner to satisfy the most exacting specifications.

300 Linear Feet of 22 Foot Width Slab per Hour

And that's not exceptional performance for the Blaw-Knox Concrete Paving Spreader — it's normal. On airport or highway paving construction this machine will handle the maximum output of two dual drum 34-E Paving Mixers. A Blaw-Knox Finishing Machine is the perfect team-mate for the Blaw-Knox Concrete Paving Spreader.

Your nearest Blaw-Knox Dealer will handle your inquiries promptly.

BLAW-KNOX

BLAW-KNOX DIVISION OF BLAW-KNOX COMPANY

2086 Farmers Bank Bldg., Pittsburgh, Pa.
NEW YORK • CHICAGO • PHILADELPHIA
BIRMINGHAM • WASHINGTON
Representatives in Principal Cities

PAVING FORMS
FOR ROADS AND AIRPORTS

STEEL STREET FORMS

CONCRETE BUCKETS

FINISHING MACHINES
FOR ROADS AND AIRPORTS

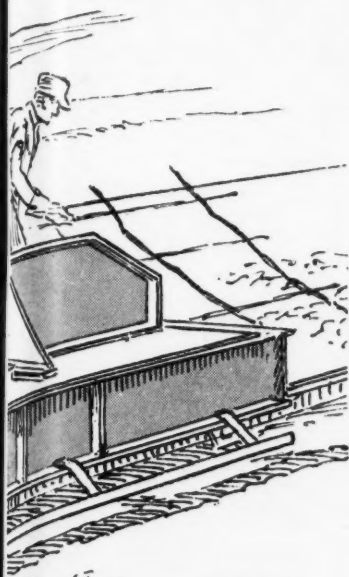
SHEEPSFOOT TAMPING
ROLLERS

BULK CEMENT PLANTS

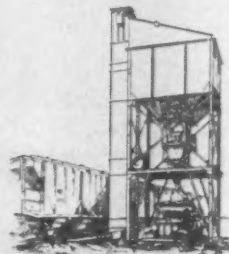
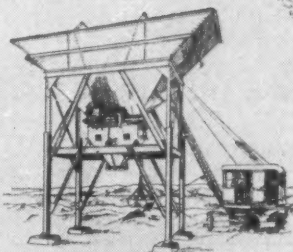
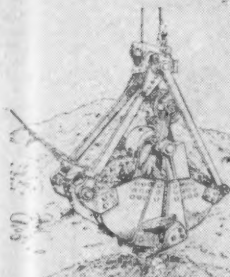
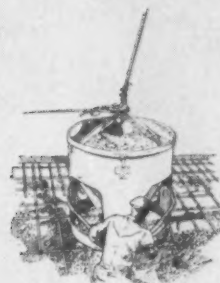
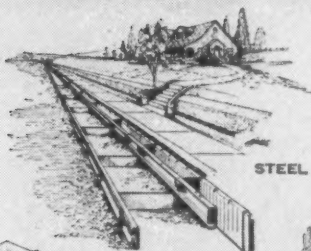
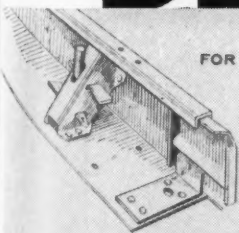
CLAMHELL BUCKETS

AGGREGATE
BATCHING PLANTS

A COMPLETE LINE OF CONSTRUCTION EQUIPMENT FOR CONCRETE PAVING OF
ROADS, STREETS AND AIRPORTS. AND FOR GENERAL CONCRETE CONSTRUCTION.



6 plants of
Blaw-Knox Company
have been awarded
the Army-Navy "E"
for excellence



**HOW YOU
PROFIT BY**



Pre-Engineering

•Here's a factory-built conveyor system that will fit your custom-built plant completely!

No special engineering. No delay for estimates on cost. No weeks of waiting for factory fabrication. Barber-Greene Conveyors are pre-engineered—pre-fabricated!

B-G Conveyors are built in a variety of sizes, forms and capacities to meet any material handling requirement... can be installed anywhere.

Erection costs? Your own workmen can install a B-G Conveyor system quickly, easily. Units arrive on the job conveniently marked. Factory assembled terminals and standardized units simplify and speed erection.

Barber-Greene Conveyors are *standardized*. You can make additions and alterations rapidly... move it to a new location with 100% salvage.

Factory assembly assures correct alignment in erection—reduces belt wear and maintenance expense. Write for Catalog 76.

Barber-Greene Company,
Aurora, Illinois.



Barber  Greene

Constant Flow Equipment

(Continued from page 132)

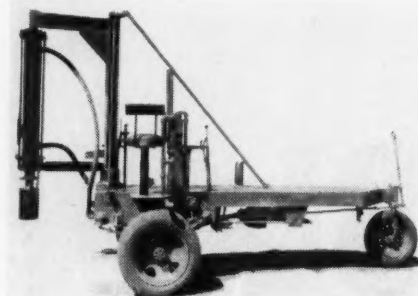
large nut on the threaded end was tightened to produce the desired tension in the rod.

At the waterfront end of each tierod the steel pile bulkhead was held by a pair of 12-in., 65-lb. wide-flange steel beam wales whose flanges were cut to form a hole through which the threaded end of the tierod extended. A 6x15x2-in. steel plate was placed over the end of the tierod to serve as a washer against which a nut was tightened.

Thus the new sheet pile bulkhead was securely tied by 26 strings of horizontal rods at intervals of 15 ft. to the line of deadmen beyond the shipway and the safety of the cinder fill, supporting the ship under construction, was assured.

Personnel

The operations of the George W. Rogers Construction Corp. on this unique pier repair project were directed by George W. Rogers, president, with immediate supervision of design and construction handled by Edward G. Carey, vice-president and chief engineer, James Hastings, general superintendent, and Joseph Hoogendoorn, job superintendent. In charge of the project for the Bethlehem Steel Company was Joseph S. Myers, plant engineer, New York yards, Shipbuilding Division.



Junior **RAPID PAVEMENT CONCRETE BREAKER**

**Fastest Pneumatic Method
Cuts Cost and Time
Works Inside or Out
Good for all Small Jobs**

**Ask about our
HEAVY-DUTY TYPE
RAPID PAVEMENT BREAKER
COMPANY**

1517 Santa Fe Ave. Los Angeles 21, Calif.



COMPRESSED AIR FOR CONSTRUCTION JOBS

SCHRAMM OFFERS THESE *Exclusive*
COMPRESSOR • ECONOMY FEATURES



*This Stands for Honorable
Service for Our Country*

Four features make Schramm Air Compressors ideal for construction jobs . . . (1) 100% water cooled (2) Compact—lightweight (3) Mechanical intake valve (4) Forced feed lubrication. These features enable you to do your compressed air job quickly—easily—economically!

Schramm Air Compressors are designed for heavy duty, continuous service, with minimum attention. They are built in sizes ranging from

20 to 420 cu. ft. of actual air, in every type of mounting and assembly. Lightweight, compact, sturdy, they are easily moved about on the job. Other Schramm features include long life discharge valve and complete push button electric starter. Make your construction jobs easier by using a Schramm Air Compressor to get air wherever needed. Write today for details contained in new, informative booklets just published.

SCHRAMM INC.

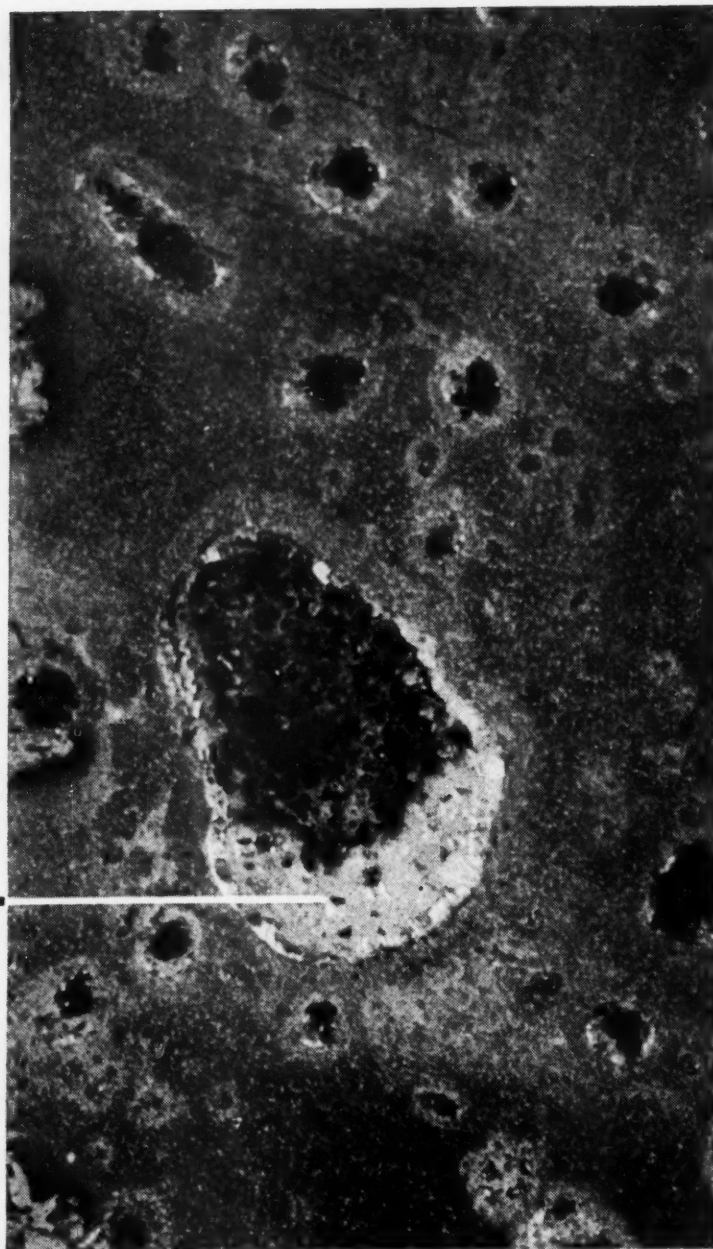
THE COMPRESSOR PEOPLE
WEST CHESTER
PENNSYLVANIA

How much would you save —IF YOU ELIMINATED RUST? —

RUST COSTS AMERICAN INDUSTRY
WELL OVER THE WHOPPING SUM
OF \$100,000,000 A YEAR! —

Take a minute to figure out how much this liability takes out of *your* pocket — then see if it isn't worth your while to spend a few more minutes with a Cities Service engineer, who will show you how a simple rust prevention plan can quickly eliminate this cost.

Two proved, effective Cities Service products will do the job:



Cities Service **RUST REMOVER** clears metals of rust or tarnish. Works quickly . . . easy to apply.

• • •
Cities Service **ANTI-CORRODE**, in many forms, is available for every industrial need . . . Provides an impenetrable film that protects parts against rust or corrosion.

Rust can be eliminated . . . and Cities Service can help you. Call our nearest office or —

**MAIL THIS COUPON
◀ TODAY!**

CITIES SERVICE OIL COMPANY

ARKANSAS FUEL OIL COMPANY



Cities Service Oil Company
Room 446, 70 Pine Street
New York 5, New York

Gentlemen: Please send me full information on Cities Service Rust Prevention Plan.

Name.....

Title.....

Company.....

Address.....

City..... State.....

Stays "out"

LONGER

ADJUSTMENTS
ARE SIMPLE
AND HOLD THEIR SETTING

TROUBLE-FREE
PERFORMANCE
SAVES OPERATOR'S TIME

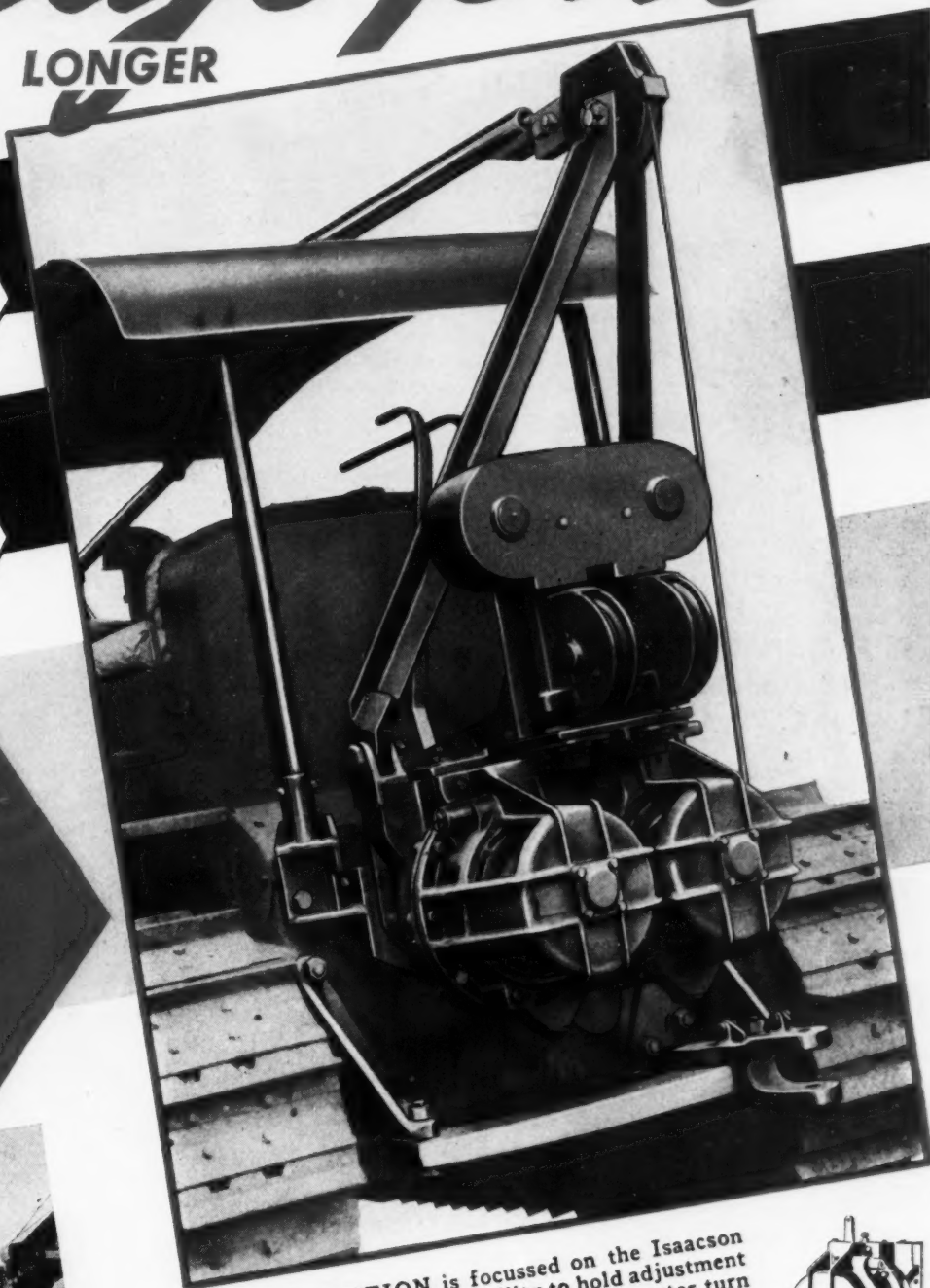
It's the
ISAACSON

DOUBLE DRUM

**KABLE
POWER
UNIT**



• Double drum model mounted on an Isaacson Kable Trac-Dozer.



NATIONAL ATTENTION is focussed on the Isaacson Kable Power Unit because of its ability to hold adjustment longer. It's quick and easy to adjust too—one-quarter turn moves friction adjustment without removing guards. It's built for heavy duty jobs where the going is tough and continuous . . . where "trouble-free" operation means the difference between profit and loss. Insure your profits with an Isaacson Kable Power Unit.

Write direct today for detailed information.



Front mounted single drum models also available.

ISAACSON

A PRODUCT OF THE ISAACSON IRON WORKS • SEATTLE



YOU CAN'T KILL TIGERS WITH A Fly Swatter

and you can't economically drive modern piles with anything but a rugged hammer that packs a real wallop.

SUPER-VULCAN OPEN TYPE DIFFERENTIAL-ACTING PILE HAMMERS 18C, 30C, 50C and 80C

have the punch necessary to sock the pile down where you want it. Don't worry about the kind of piles the specs call for—wood, heavy concrete, steel beam, or open tube—they all look alike to the Super-VULCAN line.

Four sizes of Super-VULCAN — 18c, 30c, 50c, and 80c—meet every pile driving need. They are fast performers for you get rapid blows without losing that necessary punch and they are money savers too, for they use from 25 to 35 per cent less steam.

Remember too, that the Super-VULCAN open-type fits the same leads and uses the same accessories as the old favorite VULCAN Single-Acting Pile Hammer—they'll work on air too.



Sizes
18C—30C—50C—80C
meet all needs

VULCAN IRON WORKS
Since 1852

331 North Bell Avenue



Chicago 12 --- Illinois

Maintaining Secondary Roads

(Continued from page 106)

idents of rural areas to drive far before reaching what might be termed an all-weather road, even though the road may not be paved.

There was considerable opposition to passage of the original bill by the legislature of 1931, requiring the state commission to take over the county road system, but since its passage no additional bills have been introduced to return the roads to the jurisdiction of the counties. It can be safely said that 95 percent of the people in the state are pleased with the plan of having the county, or secondary, roads maintained by the state rather than by 100 separate county units. There is no doubt that this plan has saved millions of dollars for the taxpayers; and the secondary roads are in much better condition today than they were in 1931. The

(Continued on page 142)

EMBURY

Luck-E-Lite

HIGHWAY TORCHES

*The Dependable
Watchman!*

Order through Your Jobber
EMBURY MFG. CO., WARSAW, N. Y.

Worthington-Ransome Blue Brute Distributors

By referring to the advertisement on page 141, you'll learn the meaning of the (1), (2) or (1-2) beside their names.

- Ala., Birmingham (1) J. D. Pittman Tractor Co.
- Ariz., Phoenix (2) Smith Booth Usher Co.
- Ark., Fort Smith (2) R. A. Young & Son
- Little Rock (1) Kern-Limerick, Inc.
- Little Rock (2) R. A. Young & Son
- Calif., Los Angeles (1) Garlinghouse Bros.
- Los Angeles (1-2) Smith Booth Usher Co.
- San Francisco (1-2) Coast Equipment Co.
- Colo., Denver (2) John N. Meade
- Denver (1-2) Power Equipment Co.
- Conn., Hartford (2) The Holmes-Talcott Co.
- New Haven (1) W. I. Clark
- Waterbury (1) Contractors Supply Co.
- D. C., Washington (1) M. A. Doetsch Machinery Co.
- Miami (1-2) Allied Equipment, Inc.
- Ga., Atlanta (1-2) Tractor & Machinery Co.
- Savannah (1) Morgans, Inc.
- Ida., Boise (1-2) Olson Manufacturing Co.
- Ill., Chicago (1-2) Chicago Construction Equipment Co.
- Chicago (2) John A. Roche
- Chicago (1) Thomas Holst Co.
- Ind., Fort Wayne (1) American Steel Supply Co.
- Indianapolis (2) Reid-Holcomb Co.
- Iowa, Des Moines (2) Electric Eng. & Const. Co.
- Ky., Harlan (2) Hall Equipment Sales Co.
- Louisville (2) T. C. Coleman & Son
- Louisville (2) Williams Tractor Co.
- Paducah (1) Henry A. Pettey Supply Co.
- La., New Orleans (1) Ole K. Olson Co.
- New Orleans (2) Wm. F. Surgi Equipment Co.
- Maine, Portland (1-2) Maine Truck-Tractor Co.
- Md., Baltimore (1) Stuart M. Christliff & Co.
- Baltimore (2) D. C. Elphinstone, Inc.
- Mass., Boston, Allston (1-2) Clark-Wilcox Co.
- Cambridge (2) Field Mach. Co.
- Mich., Detroit (1) T. G. Abrams
- Detroit (2) W. H. Anderson Co., Inc.
- Dearborn (2) Thomas G. Abrams
- Flint (2) Grandsen-Hall & Co.
- Muskegon (1-2) Lakeshore Machinery & Supply Co.
- Minn., Minneapolis (1-2) Phillip-Murphy Equip. Co.
- St. Paul (2) D. L. O'Brien
- Miss., Jackson (1) Jackson Road Equipment Co.
- Mo., Clayton (1-2) The Howard Corporation
- Kansas City (1) Brown-Strauss Corp.
- Kansas City (2) Machinery & Supplies Co.
- St. Louis (2) W. H. Reeves
- Neb., Lincoln (1) Highway Equipment & Supply Co.
- N. J., Hillside (2) P. A. Drobach
- Newark (1) Johnson & Dealman
- North Bergen (2) American Air Compressor Corp.
- N. M., Albuquerque (2) Bud Fisher Co.
- Roswell (2) Smith Machinery Co.
- N. Y., Albany (1-2) Milton-Hale Machinery Co.
- Buffalo (2) Dow & Co., Inc.
- New York (2) Air Compressor Rental & Sales
- New York (1-2) Hodge & Hammond, Inc.
- New York (1-2) Railroad Materials Corporation
- Olean (2) Freeborn Equipment Co.
- N. C., Raleigh (2) Carolina Tractor & Equipment Co.
- N. C. (1) Smith Equipment Co.
- N. D., Fargo (1-2) Smith Commercial Body Works, Inc.
- O., Cincinnati (2) Finn Equipment Co.
- Cleveland (2) S. M. Clancey
- Cleveland (1) H. B. Fuller Equipment Co.
- Cleveland (2) Gibson-Stewart Co.
- Marietta (2) Northwest Supply & Equipment Co.
- Toledo (2) M. W. Kilcorse & Co.
- Oregon, Portland (2) Andrews Equipment Service
- Pa., Allentown (2) H. N. Crowder, Jr., Inc.
- Easton (2) Sears & Bowers
- Oil City (2) Freeborn Equipment Co.
- Philadelphia (1) Giles & Ransome
- Philadelphia (2) Metalweld, Inc.
- Pittsburgh (2) Atlas Equipment Corp.
- Wilkes-Barre (2) Ensminger & Co.
- Wilkes-Barre (1) Arrow Supply Co.
- S. C., Columbia (1-2) Smith Equipment Co.
- Tenn., Knoxville (2) Wilson-Weesner-Wilkinson
- Memphis (2) Tri-State Equipment Co.
- Tex., Dallas (2) Shaw Equipment Co.
- El Paso (2) Equipment Supply Co.
- El Paso (1) Mine and Smelter Supply Co.
- Houston (2) Dye Welding Supply Co.
- Houston (1) McCall Tractor & Equipment Co.
- San Antonio (2) Patten Machinery Co.
- San Antonio (1) San Antonio Machine & Supply Co.
- Utah, Salt Lake City (1-2) Landes Engineering Co.
- Vt., Barre (1-2) A. M. Flanders, Inc.
- Va., Richmond (1-2) Highway Machinery & Supply Co.
- Wash., Seattle (2) Star Machinery Co.
- Spokane (2) Andrews Equipment Service
- W. Va., Charleston (1) West Virginia Co.
- Fairmont (2) Interstate Engineers & Constr., Inc.
- Wisc., Milwaukee (1) Mekeel Engineering Co.
- Wyoming, Cheyenne (2) Wilson Equipment & Supply Co.

Buy Blue Brutes

Worthington Pump and Machinery Corp.

Worthington-Ransome Construction
Equipment Division
Holyoke, Massachusetts

THIS "LIVE BOOM" PAVER LOWERS COSTS



Let's consider the unique advantages of the boom on a standard 34-E Ransome Blue Brute "Dual Drum" Paver to see why you can lay more yardage . . . more accurately . . . with less manpower . . . than with any other paver.

Because this boom is really a "live boom" just like your crawler crane, it can be power-elevated to allow 9 ft. clearance under the bucket. And the paver can be operated *continuously* with the boom in the elevated position.

Think what that means. Whenever you want, or as often as you want, you can concrete retaining walls, abutments, headwalls, etc. in one operation *at the same time you lay the slab*. You

eliminate the extra expense of doing those operations separately.

Moreover, because this "live boom" *spreads as it swings* it covers wider area with each batch . . . cuts down on costly hand shoveling.

OTHER BLUE BRUTE PLUSES

In addition, a Blue Brute "Dual Drum" Paver has the fastest-charging, self-cleaning skip . . . hydraulically-controlled bucket, eliminating split batches . . . metal-to-metal spiral cut-off for precise water measuring . . . mechanically-operated batchmeter for all-season accuracy. These and other features are described in detail in Bulletin 208. Write for it.

24RS-3

BUY BLUE BRUTES

KNOW YOUR

BLUE BRUTES

Your Blue Brute Distributor will gladly show you how Worthington-Ransome Blue Brute construction equipment will put your planning on a profitable basis and prove that *there's more worth in Worthington-Ransome*. Act now! His name is listed on page 140. The number beside his name indicates the Blue Brutes he handles.

1.

Blue Brutes include: Pavers, Concrete Spreaders**, Concrete Mixers, Concrete Placing Equipment, Big Mixers, Finishing Machines**, Pneumatic Placing & Grouting Equipment, Truck Mixers, Plaster & Bituminous Mixers, and accessories.

2.

Blue Brutes also include: Diesel, gasoline and electric driven Portable Compressors from 60 to 500 cu. ft. capacity in mountings to suit all jobs; Rock Drills and Air Tools in a wide range of weights and sizes; Contractors' Pumps.**

**Postwar Products



Truck Mixers
Capacities:
2, 3, 4½, 5½ cu. yds.



Portable Mixers
Capacities:
3½, 7, 10, 14 cu. ft.



Big Stationary Mixers
Capacities:
28, 56, 84, 126 cu. ft.



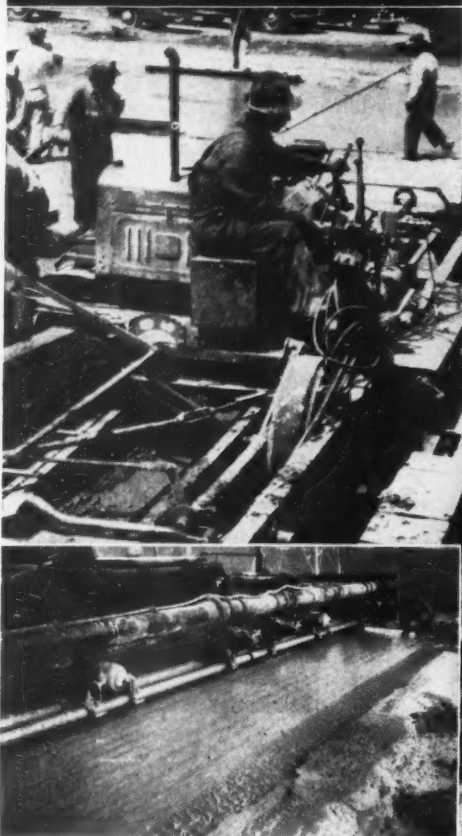
Pneumatic Placer
Capacity:
7, 14, 28 cu. ft.

WORTHINGTON



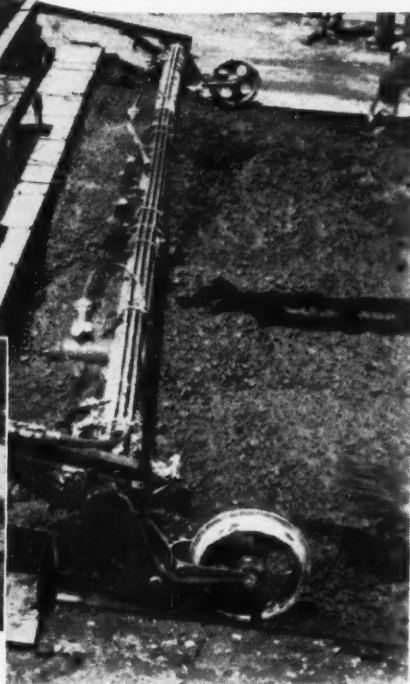
Worthington Pump and Machinery Corporation, Worthington-Ransome Construction Equipment Division
Holyoke, Mass.

JACKSON VIBRATORY PAVING TUBES



Upper photo shows dual vibrating tubes submerged. Inset—tubes raised.

*Will help
YOU
Knock off those
BIG JOBS
and
NET MAXIMUM
Profits!*



Here's the machine that will enable you to meet and beat competition — to handle more of those highway and airport paving jobs and to realize the largest possible profit margin. It's keyed perfectly to the big post-war paving program. Added to the features which have long made it the most advantageous equipment of its type are many refinements coming out of its wide application to wartime paving of airports.

HERE ARE, SPECIFICALLY, SOME OF THE THINGS THE JACKSON VIBRATORY PAVING TUBE WILL DO FOR YOU:

- ✓ 1 Gives you perfect compaction and placement of even the harsh, otherwise unworkable mixes, and thus
- ✓ 2 Enables you to take full advantage of the dryer, more economical mixes.
- ✓ 3 Provides faster finisher progress.
- ✓ 4 Perfect puddling of concrete at the joints and side forms.
- ✓ 5 Through internal vibration of thick slabs up to 25 feet in width.
- ✓ 6 Ample reserve power to offset fast drying and setting conditions.
- ✓ 7 Ample Power Plant reserve to run extra vibrators, tools and lights.

To capitalize to the hilt on the unprecedented paving program ahead, by all means get the complete details on JACKSON Vibratory Paving Tubes. Write today.

Manufactured for
JACKSON VIBRATORS, Inc.
by ELECTRIC TAMPER & EQUIPMENT CO., LUDINGTON, MICH.

(Continued from page 140)

improvement exists even after 3 years of war, during which lack of equipment and manpower made it necessary to limit operations to routine maintenance work.

Earth roads on the secondary system lose an average of about 1 in. of soil or sand-clay each year. This loss results from washing by heavy rains and dusting by fast-moving traffic. Where gravel and crushed stone are used for stabilizing roads—mostly in the Piedmont and western North Carolina where these materials are available—the loss is somewhat less, averaging about ½ in. per year. The amount of loss depends to a great extent on the volume of traffic and to a considerable extent on the terrain and the adequacy of drainage.

In the depression years of 1931-34, when the state took over the maintenance and upkeep of the county road system, sufficient funds were not available to do a great deal in improving the general condition of the secondary roads. From 1935, however, until the beginning of the war, great strides were made in adding stabilizing material to a large mileage of the secondary system. As a result of central control and efficient expenditure of funds for maintenance and improvement, the North Carolina secondary road system was in better condition during this period than any similar system in any other rural state in the nation.

Since the beginning of the war, lack of manpower and equipment has made it impossible to continue the program of adding stabilizing materials to the secondary system, except on a very small scale. It has been necessary to concentrate mostly on routine maintenance work even though there has been sufficient money to do considerably more work. As soon as equipment and manpower can be obtained in adequate quantities, the state plans to resume its improvement program on an accelerated scale to offset, to some extent, the work which could not be done during the war.

It has been a policy of the commission to concentrate on the general improvement of as many as possible of the county roads by strengthening weak places as they develop. Also, the commission has endeavored to keep a large percentage of the mileage in shape for travel during as much of the year as possible. All-weather travel is important, especially in keeping mail routes open and in permitting school buses to operate. School buses use about 46,000 mi. of the system daily during the school months.

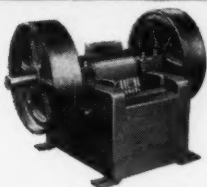
As the state can still be considered largely rural, with some sections sparsely populated, the amount of traffic which moves over a large portion of the secondary roads is not sufficient to justify paving and maintenance costs. Because

(Continued on page 146)

PIONEER

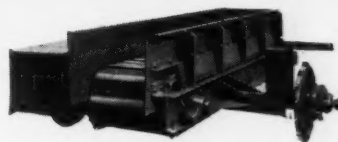
ROCK, ORE and GRAVEL CRUSHING · SCREENING · WASHING · HANDLING

Plants and Equipment



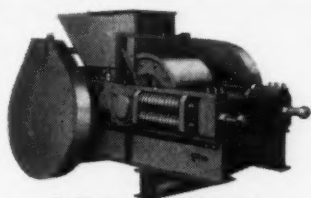
JAW CRUSHERS

Overhead eccentric type for primary crushing. Will handle large material, has downward and forward crushing action. Sturdy design for high tonnage capacity.



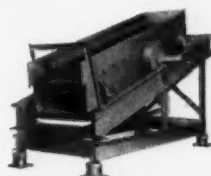
FEEDERS

Regulate flow of material to crushers to assure continuous high production. Medium and heavy duty types, horizontal or inclined; will bypass undersize.



ROLL CRUSHERS

For secondary crushing and fine reduction. Star gears driven by belt and countershaft; manganese shells and anti-friction bearings. Delivers large tonnage, accurately sized.



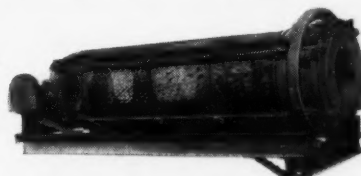
VIBRATOR SCREENS

Positive, uniform agitation. Circular motion for fast, accurate screening. Perfectly balanced, 4 SKF bearings for smooth operation; long life. Sagless, replaceable screens.



BELT CONVEYORS AND ACCESSORIES

Standard sectional, knock-down type, welded lattice frame reinforced. Plain or anti-friction bearings. Straight or troughing idlers, supports and belt tighteners.



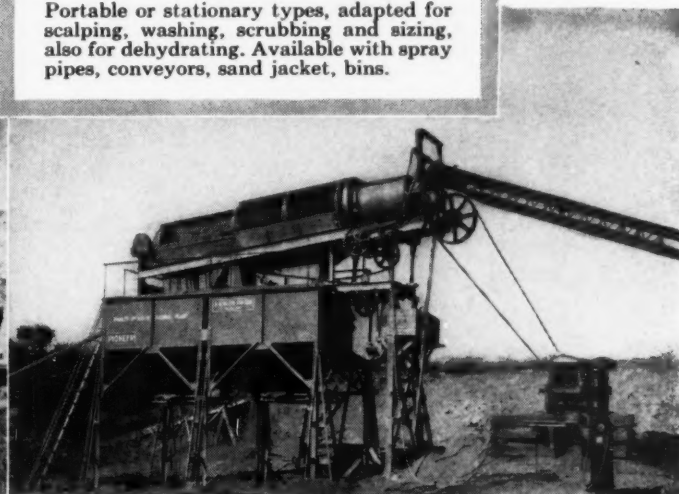
REVOLVING SCREENS

Portable or stationary types, adapted for scalping, washing, scrubbing and sizing, also for dehydrating. Available with spray pipes, conveyors, sand jacket, bins.



Portable Gravel Plants

Have primary and secondary crushers, screen and conveyor. Produce aggregate for road surfacing and other construction. Available in 5 sizes, capacities to 300 t.p.h. Washing and dehydrating equipment optional.



Portable Washing Plants

Washes, screens and dehydrates to produce sand and several sizes of aggregate. Crusher optional. Pioneer also builds portable and stationary quarry plants, as well as travel-mix and central mix bituminous plants.

Pioneer
ENGINEERING WORKS

Jaw Crushers - Roll Crushers - Screens - Conveyors - Feeders - Washers

ENGINEERS and
MANUFACTURERS of
QUARRY-GRAVEL
and
MINING MACHINERY

MINNEAPOLIS 13, MINN.

When you buy

CONSTRUCTION EQUIPMENT



Amortize the cost over many months . . . let the equipment help pay for itself out of earning capacity . . . conserve your working capital for materials, pay rolls, overhead!

Let C.I.T. furnish the funds with which to buy machinery and equipment. Combine several purchases, if you wish, in one obligation . . . retire the investment through a series of payments arranged to suit the needs of your business.

It's easy to make all necessary arrangements. Our nearest office will handle every detail of the transaction for you or, simply tell your distributor that you wish to have C.I.T. finance your purchase on an extended payment plan.

The C.I.T. Construction Equipment Finance Plan Includes:

Facilities for purchasing all the machinery and equipment necessary.

Terms of repayment arranged to suit the particular needs of your business.

Low cost; prompt action; any amount — send for details.

C.I.T. CORPORATION

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LEADERSHIP

AFFILIATED WITH COMMERCIAL INVESTMENT TRUST INCORPORATED

**GORMAN-RUPP PUMPS
WILL OUTPERFORM
AND OUTLIVE
OTHER EQUIPMENT**

*--- here are some
reasons why*

You can't get the real story of a Gorman-Rupp pump from looking at the outside. It's the simplicity and good design inside that makes this the most efficient, trouble-free pump you can get.

*There are no by-passes, no pipes, no valves - nothing to do in priming but start the motor and you start the water. Since such makeshifts rob a pump of as much as 30 per cent of its running capacity, the greater priming simplicity of Gorman-Rupp pumps pays off in more work for less fuel and power.

*Gorman-Rupp pumps are streamlined inside where streamlining counts! Smooth surfaces, no traps and a design that flows with the water adds another big factor to efficiency and prevents clogging. These pumps will handle any muck or

solids that will pass the intake and clear them out of the pump body.

*The G-R impeller operates at motor speed, without reduction gears - another source of wear, trouble and maintenance eliminated. This impeller is the only moving part and rotates on high grade roller bearings.

*Every part of a Gorman-Rupp pump has long wear built into it, and every wearing part is replaceable without tearing the pump apart. This maintenance can be done by an unskilled man with common tools.

These are a few reasons why Gorman-Rupp self-priming centrifugal pumps will out-perform and outlive any other comparable equipment. Write for further detailed information.



THE

GORMAN-RUPP COMPANY

308 BOWMAN STREET • MANSFIELD, OHIO



...with the **BUDA** {earth drill

• Speed saves money in pole line work. And BUDA Earth Drills do their part by digging straight, clean holes 40 times as fast as by hand.

Illustrated above is a typical set-up using the standard BUDA HBD Earth Drill with a separately powered winch and pole setting derrick mounted on the same truck.

Self-contained BUDA Earth Drill models are furnished to drill large and small diameter holes to a 24' depth, also deep hole or testing drills for digging small diameter holes to 100'. Write or wire for illustrated bulletins.



BUDA Model 2215-SB "All-Purpose" Automatic Lowering Jack. 15 ton capacity.

BUDA Model No. 5010 Ball Bearing Mechanical Jack. 50 ton capacity.



BUDA

15425 Commercial Ave.

Harvey (Chicago Suburb) Illinois

(Continued from page 142)

of the policy of keeping a large mileage open to traffic in all weather, the state has not had sufficient construction funds to pave as many miles as desired.

Traffic on Secondary Roads

On the secondary road system a total of 2,152 mi. of highway is paved, and of the remainder at least 95 percent is passable for the entire year. In 1938 a complete survey of traffic on the entire rural system was made. An accompanying table, based on data obtained in this survey, lists the mileage of secondary roads in traffic volume groups.

North Carolina Secondary Roads 1938 Traffic Survey

Vehicles per day	Secondary Roads, Miles	Percentage of Total Mileage
0- 9	4,929	10.7
10- 24	13,160	28.7
25- 49	14,529	31.7
50- 99	9,118	19.9
100- 199	3,178	6.9
200- 299	532	1.2
300- 399	213	0.5
400- 499	84	0.2
500- 599	51	0.1
600- 699	35	0.1
700- 799	16	—
800- 899	9	—
900- 999	4	—
1000- 1099	8	—
1200- 1299	3	—
1500- 1999	3	—

TOTAL..... 45,875 100.00

It may be seen from the table that 71.1 percent of North Carolina's rural secondary mileage in 1938 carried less than 50 vehicles per day, and 91 percent carried less than 100 per day. Traffic in 1941 was generally above that of 1938, but mileage had also increased, so results were about the same as shown in the table for 1938.

Current Highway Appropriation


Maintenance and betterment appropriations for the state and county road system for each year of the biennium beginning July 1, 1945, are as follows:

Maintenance of state highways..	\$ 5,500,000
Maintenance of secondary roads..	10,000,000
General betterment—state and county	5,000,000
General betterment—county highways	5,000,000
Maintenance and improvement of state highways and county road extensions in municipalities	1,000,000

There is also appropriated for the first year of the biennium \$2,500,000 for re-treatment work on paved highways, including low-type bituminous roads, and \$3,000,000 for the same purpose for the second year of the biennium. Maintenance funds appropriated will be used to take care of routine maintenance

(Continued on page 148)

Outlasts Other Canvas **MANY TIMES OVER**

- 
- Because flammable canvas presents a major fire hazard indoors or out — WM. E. HOOPER & SONS COMPANY, with more than a century of "Canvas Engineering" behind them, did something about it.

The result was the first practical fire-resistant canvas.

But this amazing development did not stop there.

Mildew and the sun's ultra-violet rays — the other arch-enemies of Cotton Duck — made canvas disintegrate years before its useful life was worn out.

FIRE CHIEF-Finished Hooperwood Duck combines resistance to all three. And its protection is permanent — it won't wash, leach or bleach out — it increases the life of canvas goods many times over.

For public safety's sake and insurance against premature deterioration of tarpaulins, wind-breaks, truck covers, tents, awnings, boat and hatch covers, welding curtains and many other countless canvas products in use on land and sea — it's good business to insist on FIRE CHIEF-Finished Hooperwood Canvas.

Stronger. Lasts longer. Resistant to fire, water, weather, mildew and wear.

WM. E. HOOPER & SONS CO.

New York **PHILADELPHIA** Chicago

Mills: **WOODBERRY, BALTIMORE, MD.**

• *Fire-Chief Finished* (PATENTED) •

HOOPERWOOD COTTON DUCK

Amsco "COUNTERFLOW" Pumps Offer the Key to Profitable Sand and Gravel Dredging

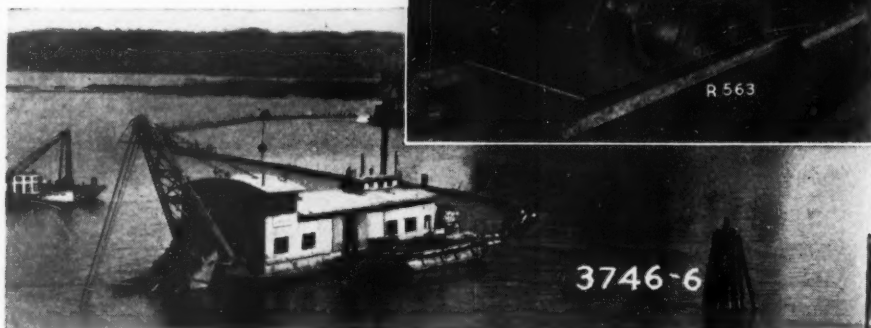
Wherever sand and gravel are being dredged at lowest cost and with minimum maintainance and shut-down time, you are likely to find an Amsco "COUNTERFLOW" Pump on the job. For steady, economical, trouble-free dredging of aggregates, the sand and gravel industry has voted overwhelmingly with its equipment dollars for Amsco manganese steel pumps. More Amsco dredge pumps are used for sand and gravel production than any other make, and for definite reasons.

The water ends including shells, impellers, side plates and liners of Amsco dredge pumps are made of austenitic manganese steel which, beyond comparison, resists abrasion associated with severe repeated impacts. No other metal will so long and well withstand the destructive action of the material handled.

end thrust and internal leakage. The funnel-mouthed impeller with wide throat passages assures minimum flow resistance. Another valuable feature of Amsco design is the method of securely attaching the impeller to the shaft, either with threads or tapered bore and locknut.

The toughness and wear hardness of Amsco manganese steel make it ideal, also for rotary cutters and for dredge pipeline fittings, pipe elbows, nipples, reducers, expansion joints and flap valves.

Send for literature on Amsco dredge pumps and Bulletin 844-D — "Manganese Steel For All Dredging Purposes."



The "COUNTERFLOW" design of Amsco dredge pumps forces circulation of clear water between the impeller shrouds and the side plate liners, reducing abrasive wear and minimizing

R-563. 16" Amsco "COUNTERFLOW" Dredge Pump, Type "XH-CF", Form 44, used on dredge which produced sand and gravel for the Arkabutla Dam.

3746-6. The Dredge "America", equipped with a 16" Amsco Dredge Pump, Type "XH", Form 44, for "hogging" aggregates out of the Illinois River.

Amsco Conservation Welding Products prolong service life of ferrous parts. Send for Bulletin 941-W

Amsco
AMERICAN MANGANESE STEEL DIVISION
Chicago Heights, Illinois
FOUNDRIES AT CHICAGO HEIGHTS, ILL.; NEW CASTLE, DEL.; DENVER, COLO.; OAKLAND, CALIF.; LOS ANGELES, CALIF.; ST. LOUIS, MO.
OFFICES IN PRINCIPAL CITIES

AMERICAN
Brake Shoe
COMPANY

(Continued from page 146)

work and, after that, for general improvement of the county road system.

Betterment funds for general improvement of the county road system will be used for new material to strengthen weak places in the county system and to replace stabilizing material which has washed and blown away. A portion of these funds will be used for relocation and improvement of secondary roads, including grading, structures, construction of base course, and light bituminous treatment.

Use of Local Material

In maintenance of secondary roads the greatest possible use is made of satisfactory local material, thus reducing maintenance costs. In the eastern part of the state, where sand is prevalent, clay is located when possible and mixed with the sand to make a sand-clay road. In the Piedmont section, topsoil, creek sand and stone are used for maintenance work. In the mountains, creek gravel and crushed stone are the only local materials available.

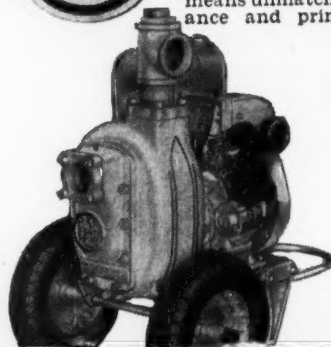
PART 2 OF THIS ARTICLE, describing maintenance of bridges and discussing costs of secondary roads, will appear next month.



They Can Take It
DUAL PRIMERS



When it comes to DURABILITY, CMC Dual Primers have the "guts" to stand up to those tough, steady 24-hour grinds. DUAL PRIME means unmatched performance and priming speed.



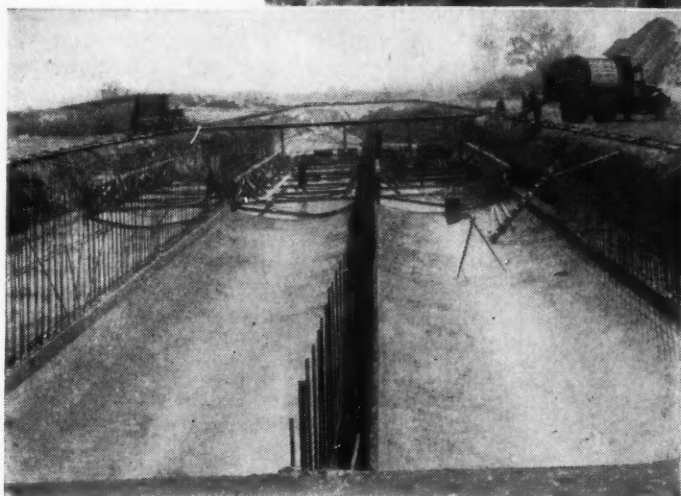
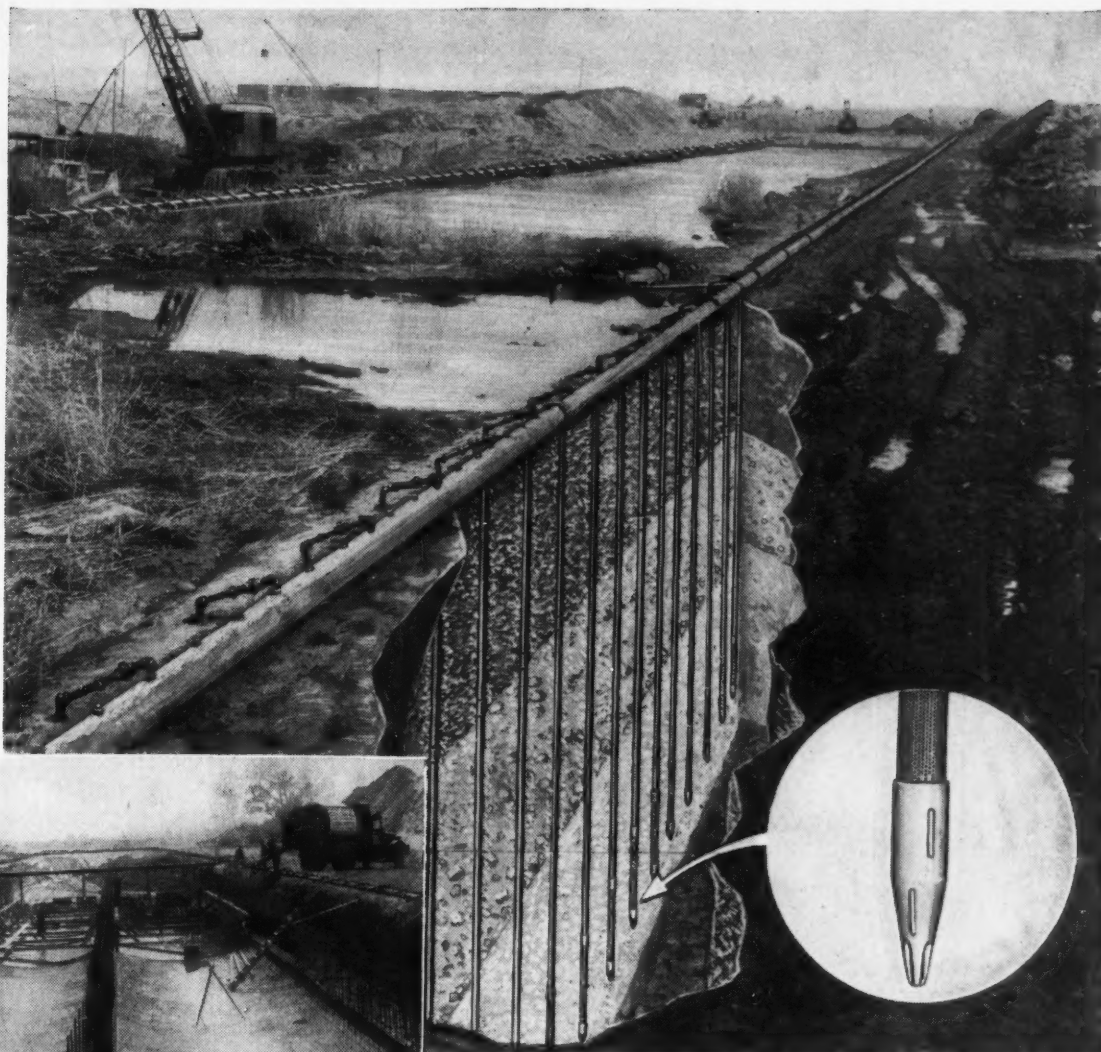
A husky 3" CMC Dual Prime. One of the complete line from 1½" to 10" sizes. Also 3" and 4" Diaphragms. Get catalog.

CONSTRUCTION MACHINERY CO.

Waterloo, Iowa

Mixers • Pumps • Hoists • Batching & Placing Equipment • Saws • Carts • Barrows

**Before
and
After**



Profit Insurance

Talk about your "before — and — after" photos! Here was the job of dewatering a waterlogged section 100 feet wide by 800 feet long, under water at high tide. Three Griffin Vac-U-Matic Pumps operating from ONE pump house, plus 300 Griffin Jet'n Wellpoints, did the work! Lower photo shows completed

sewer invert in foreground, concrete being poured in central section. Fuel costs on a similar job nearby were 10 times in excess of the Griffin Diesel-powered Wellpoint Pump. No matter what you want to build — if the job needs dewatering, Griffin will do it for you fast! This is Griffin Profit Insurance.

GRIFFIN WELLPOINT CORPORATION

MAIN OFFICE: 881 East 141st Street, New York 54, N. Y.

Equipment Leased and Sold

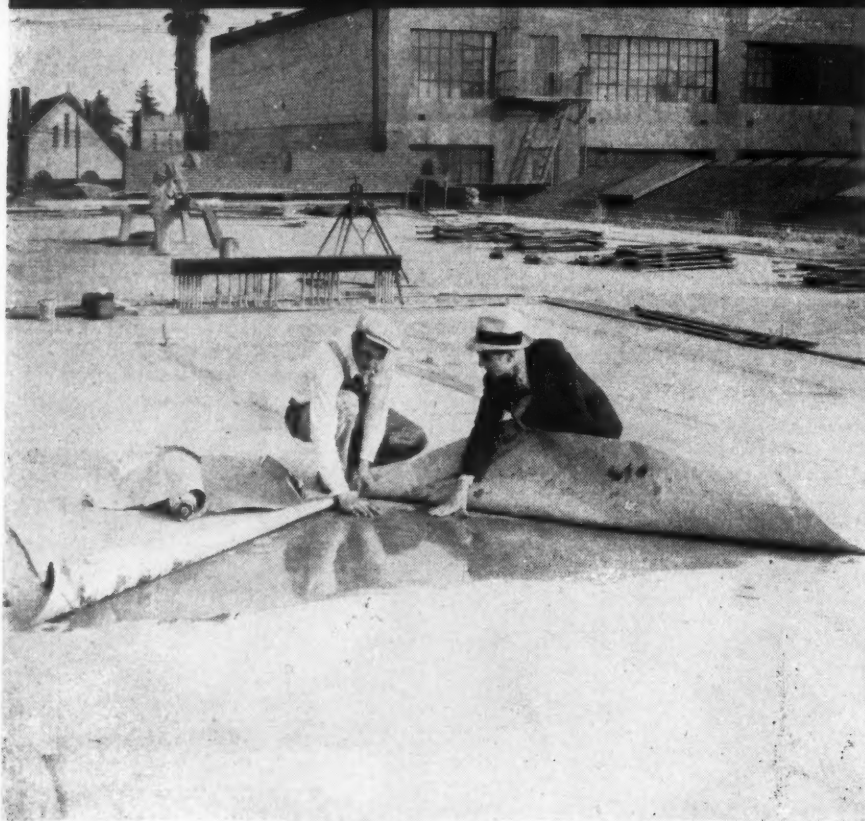
MID-WEST

GRIFFIN EQUIPMENT CO., Inc.
548 Indiana Street, Hammond 1662
Hammond, Indiana

SOUTH

GRIFFIN ENGINEERING CORP.
2016 E. Adams St., Jacksonville 5-4516
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**Greater Strength in the Slab ..
Less Work .. Low Cost ..
when you cure with SISALKRAFT**



Sisalkraft does a better job of curing — gives a hard, dense slab — because it retains the water of the original mix.

Moreover, Sisalkraft saves work — protects as it cures. Needs no watching — no sprinkling. Curing is uniform and automatic. After the curing period, the Sisalkraft covering is easily and quickly removed. No scraping — no grinding — no sand to carry away.

Construction engineers everywhere prefer the Sisalkraft method to any other method of concrete curing. Write for details on its uses in building construction — how it saves time and labor.

Two layers of asphalt make SISALKRAFT waterproof. Lengthwise and crosswise fibre reinforcement imparts amazing strength with flexibility!

Two layers of high wet strength kraft paper seal in the asphalt, preventing it from drying out. SISALKRAFT is a processed product — the result of scientific research.



Manufacturers of SISALKRAFT, FIBREEN, SISAL-X, SISALTAPE AND COPPER-ARMORED SISALKRAFT



Arc-Welded Building

(Continued from page 89)

the entire roof structure required a total of 1,680 plug welds and was completed by three operators in 14 hr. Welded areas are rendered corrosion resistant by touching up the plug welds with the same type of enamel as that used on the panel.

Welded Roof Beams and Columns

Short lengths of non-priority steel for roof beams were made continuous by welded splices centered directly over interior columns. The type of splice used is very simple. It consists of a $\frac{1}{4}$ -in. plate positioned between the ends of the beams to which a continuous $\frac{1}{4}$ -in. fillet weld is applied, connecting both sections to the plate. Continuity over all columns is thus attained, each beam becoming in effect a single length of 75 ft.

An advantage of this type of splice is that the shear is eliminated entirely and only the flexural stresses need be considered. There is also a reduction in deflection of the loaded beam to about one-ninth that of a simple beam.

After welding the splice connection the top and bottom welds are ground flush with the beam flanges to give smooth bearing surfaces for beam and column cap plate and for purlins which rest on top of beam. The column cap plate is reinforced by welded stiffener plates to increase the length of the lever arm for distributing stresses between roof beams and columns.

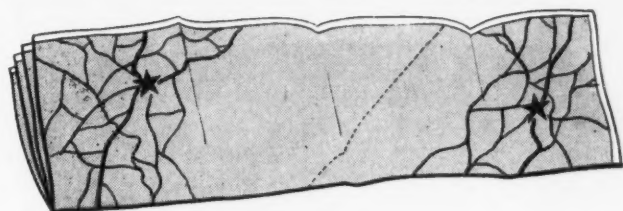
Column-Beam Connection Important

A properly designed connection between column and beam is a detail frequently overlooked in the design of small buildings. Since there are many buildings now in service which do not have a stiffener brace, such as that described here, many designers assume it is unnecessary. A number of factors, however, make the brace highly desirable in any new building. Probably the most important factor is the growing popularity of the suspended or overhead type of crane, and monorail hoists traveling on individual rails for use in processing, assembling and handling of materials.

Look at any road map.



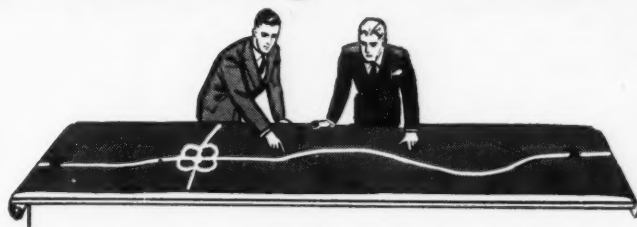
Look at the places where highways



haven't been built.

Some of those yet-to-be-built roads

will be



your jobs.

Then's when you'll need

for power shovels... cranes... grab
buckets... back hoes... trenchers
... rooters... scraper wagons...
graders... bulldozers... and other
types of road-building equipment.



When you think WIRE ROPE... think BETHLEHEM

NOW -
to build that
better



World War II was fought and won to "build a better world!"

The fighting is done—the victory is won! We are proud that Novo Construction Equipment shared in the fighting, helped in the victory!

Now is the time for building that better world! The same Novo Engines, Pumps, Hoists and Generator Sets that served in the war, are ready to take part in the peace program! A better world means more of the better things for more of mankind. To get it, efficient and economical production methods must be used!

To build that better world, use that better built CONSTRUCTION EQUIPMENT—NOVO!

A few choice territories are still open. For full details about a Novo Distributorship, write or wire to the Sales Department, Novo Engine Company.



Allied Member of A.E.D.

NOVO
ENGINE CO.



Self Priming Pumps



Hoists



Engines



Diaphragm and Pressure Pumps

Coordinated

Transit-Mix Plant

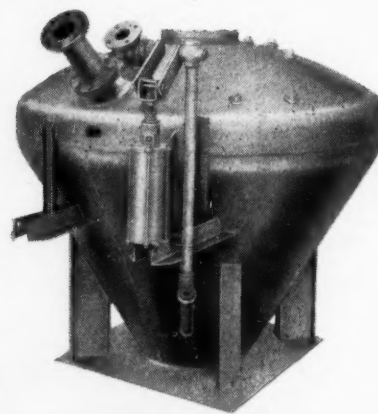
(Continued from page 80)

aggregates to the three-compartment bin. This belt was fed from a 30-in. horizontal belt which operated in a reinforced-concrete tunnel 60 ft. long; over this tunnel, material was stockpiled at times in quantities in excess of 35,000 tons. The stockpiles were maintained by a Lima 802 2-cu.yd. crane having a 75-ft. boom, occasionally supplemented by a Lorain 77 handling a 1½-yd. bucket on a 65-ft. boom.

Flow of material was accurately controlled. Loading of the feeder belt was regulated by six 18x18-in. manually operated clamshell gates spaced 8 ft. on centers; lips of the gates were 14 in.

(Continued on page 154)

Move Cement by
Air-Floating It!



The ROBINSON AIR-ACTIVATED CONVEYOR SYSTEM is practical and efficient, saving in air and maintenance. It has been used on numerous big construction jobs as well as in process plants.

You can order the entire system installed including compressor, piping, storage tanks, etc. or just the activator, such as illustrated, to be used with your own accessory equipment.

Write for Illustrated Bulletin No. 310

ROBINSON AIR-ACTIVATED CONVEYOR SYSTEMS

Division of MORSE BOULGER DESTRUCTOR CO.
 211-C EAST 42nd STREET, NEW YORK 17, N.Y.
 Representatives in all Principal Cities

YOUR DOLLARS BUY MORE
WHEN YOU BUY P&H



P&H's ADDED VALUES MEAN ADDED EARNING POWER!

● Wherever profits in the open pit depend upon steady production, P&H advantages show up. For P&H builds to quality standards far beyond those of the industry. P&H's added values make your investment a better investment for years to come.

Hydraulic Control — Smoother, faster, easier operation — less strain on machine and operator.

Planetary Transmission — Faster, more accurate crowd controls — far lower maintenance costs.

True Rolling Qualities — Easier to maneuver — less time out — less upkeep.

All Welded Construction — Rolled alloy steels provide greater strength, greater rigidity — longer life throughout.

These are but a few of P&H's added values that mean lower tonnage costs in all kinds of mining and open pit operations.

P&H EXCAVATORS
4494 W. National Avenue,
Milwaukee 14, Wisconsin

HARNISCHEGER
CORPORATION

EXCAVATORS • ELECTRIC CRANES • ARC WELDERS **P&H** HOISTS • WELDING ELECTRODES • MOTORS



Lighter Load + Longer Life = LOWER SHOVELING COSTS

It's time to check the shovels you've been buying against the advantages of the modern **RAZOR-BACK**:

- (1) The strongest light shovel ever made — of 13 ga. thickness up the middle where a shovel gets all its wear and strain, tapering to 17 ga. at the sides and with 11" long socket.
- (2) Tubular shank with deep hang and perfect working balance.
- (3) "Surface Peened" to stand more punishment, do more work.

Send for Catalog, Prices and Distributor's Name

THE UNION FORK & HOE CO
652 Hocking St., Columbus 15, Ohio

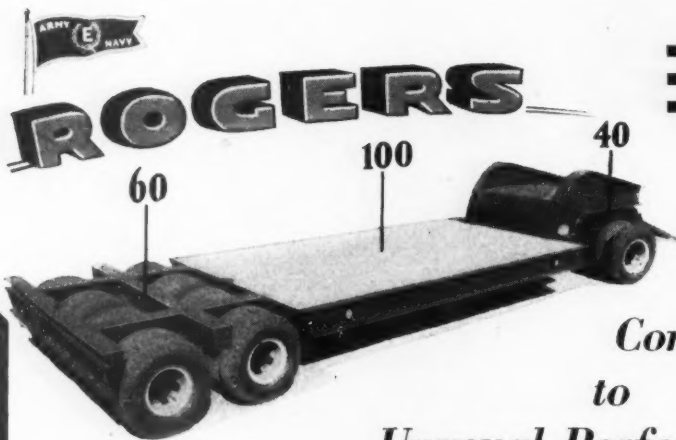


"SURFACE PEENED"—Every shovel "cold-worked" following heat treatment,—tests $2\frac{1}{2}$ to 5 times tougher than fine shovels merely heat treated.

RAZOR-BACK

THE ONLY SHOVEL WITH A BACKBONE

ALSO STONE, BALLAST INDUSTRIAL FORKS — ASPHALT AND ROAD RAKES



Contribute to Unusual Performance

ROGERS TRAILERS are so designed as to carry 60% of the load on the rear unit and 40% on the tractor.

This provides the necessary traction—distributes the load properly over all tires—and greatly improves the haulability and brakeability of both tractor and trailer.



ROGERS BROTHERS CORP.

ALBION, PENNA.

EXPERIENCE
builds 'em



PERFORMANCE
sells 'em

(Continued from page 152)

above the belt. A series of red, white and blue lights, operated from the turnhead platform over the aggregate bin, indicated the type of aggregate required. A bell signal was provided for attracting the attention of the man operating the loading gates.

Plant No. 1 consistently averaged 225 cu. yd. of concrete per hour and had a peak production of 285 cu. yd. per hour on several occasions. A 5-cu.yd. batch of sand, gravel, cement and water required an average of 52 sec. to weigh and discharge into the mixer truck when such speed was necessary. This speed was usually attained on the first round of trucks loaded at the start of the day.

Fully inclosed with corrugated sheet metal, the plant included offices where all billing, clerical work and other details were carried on. A fully equipped shop was erected at No. 1 Plant to take care of all truck maintenance and overhauling. Complete stocks of truck parts and tires were maintained at all times.

Plant No. 2

As the project increased in scope it became necessary to erect a second batching plant at the material unloading dock, 14 mi. from Plant No. 1. The average haul from the latter set-up to the point of concrete placement was $1\frac{1}{2}$ mi. Plant No. 2 was an exact duplicate of No. 1, except that the loading belts were shorter and no feeder tunnel was provided. The hourly capacity was the same.

All cement used at Plant No. 2 was trucked 14 mi. from No. 1. Three mixer trucks of 5-cu.yd. capacity trucked more than 150,000 bbl. of cement to the second plant. With water lines and bells removed from the mixers, they proved highly satisfactory in every way for hauling this cement. Unloading was accomplished by partially opening the mixer discharge gate and slowly revolving the drum in the discharge direction. Discharged cement dropped into a truck unloading hopper mounted on a 12-in. screw conveyor. The three mixer trucks frequently handled 1,200 bbl. of cement per day.

Daily Production—Average daily demand at Plant No. 1 was approximately twice that of Plant No. 2. The maximum yardage produced at No. 1 was 2,200 cu. yd. in a working day of 10 hr. At No. 2, 1,500 cu. yd. was the maximum delivered for the same working period.

Truck Mixers—At the height of construction, 58 5-cu. yd. Rex and Jaeger mixers on Mack FJ and FK trucks powered by Cummins HB diesels operated under the contract. In addition, a number of government-owned mixer trucks were loaded at the plants for miscel-

(Continued on page 156)

REPROCESSING OIL MATS

SAND-CLAY STABILIZATION

THORNTON CONSTRUCTION Co. GENERAL CONTRACTORS

1088 ETHEL AVENUE
HAWCOCK, MICH.

January 3, 1945

Seaman Motors
305 N. 25th Street
Milwaukee 3, Wisconsin

Attention: J. D. Aldrich

Gentlemen:

For your information, the Seaman Pulvi-Mixer brought and the A-G-T Associates are using on the Wisconsin C.A.A. Airport, is very satisfactory.

As you will recall, we rented a Pulvi-Mixer for stabilizing sand and clay sub-base for the Camp Williams Airport in 1942. It did such a good job of mixing that we bought this year a Model MHD 72 pulverizer. This is doing an exceptional job of mixing and our success in meeting C.A.A. specifications for compaction is due in large measure to the mixing action of Pulvi-Mixer.

From our experience to date, we feel that the machine is sturdy as our repair parts to date are very small considering the use.

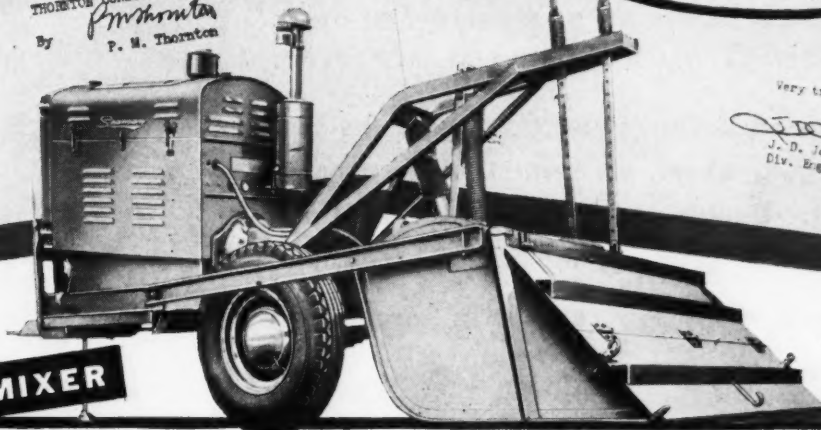
THORNTON CONSTRUCTION COMPANY

By

P. M. Thornton

PM:st

THE SEAMAN MIXER



STATE OF OKLAHOMA STATE HIGHWAY COMMISSION OKLAHOMA CITY

Mokeyee, Oklahoma
January 24, 1945

Mr. G. L. Townsend
1700-1708 W. Main
Oklahoma City, Oklahoma

Dear Mr. Townsend:

In answer to your letter of January 19, relative to the operation of our Seaman Pulvi-Mixer, we have the following remarks:

We found this machine to be a great help in the reprocessing of our oil mats in our last year's program. We found that we could do a better mixing job, use less asphalt and save the services of two motor patrols in our reprocessing work. We also found that this machine speeded our work materially. We believe it will pay for itself in one oiling season in the saving in cost of reprocessing.

We have not tried this machine in stabilizing work, but believe will compare favorably with the reprocessing work.

Very truly yours,

J. D. Jenkins,
Div. Engineer

These 2 letters prove SEAMAN Production and Performance

Mr. J. D. Jenkins, Division Engineer, Oklahoma State Highway Commission says in the letter shown above describing the work of the SEAMAN MIXER in reprocessing oil mats: "We found that we could do a better mixing job, use less asphalt and save the services of two motor patrols . . . We believe it will pay for itself in one oiling season" . . . Thank you, Mr. Jenkins. Your letter tells the story better than words of ours . . . And by way of proof of the remarkable efficiency of the SEAMAN

MIXER in soil stabilization, read the words of Mr. P. M. Thornton of the Thornton Construction Company, Hancock, Michigan . . . "We rented a Pulvi-Mixer for stabilizing sand and clay sub-base . . . It did such a good job of mixing that we bought this year a Model MHD-72. This is doing an exceptional job and our success in meeting C.A.A. specifications for compaction is due in large measure to the mixing action of the Pulvi-Mixer" . . . And thank you, Mr. Thornton. We hope these two letters prove a point or two.



Packed with practical information, SOIL STABILIZATION METHODS will be sent on request. Just ask for Bulletin C-24.

SEAMAN MOTORS
MILWAUKEE 3, WISCONSIN

C-110



PARSONS *Wheel* TRENCHLINER

Improved wheel bottom support insures accurate grading, maximum production

TWO double-wheeled dollies, not one, support the bottom of the digging wheel, the section where digging pressure is greatest. Double support prevents wheel distortion, insures accurate grading, maximum production.

NEW CATALOG JUST OUT!

Performance:

Digging Depth: 5' 6" maximum.

Digging Widths:

Buckets only: 15" 18" 21"

With Sidecutters 20" 23" 26"

Digging Speeds: 25, from 2.5" to 118" per minute.

Travel Speeds: 5, from 1/2 to 2.7 miles per hour.

Wheel Speeds: 5, from 36 to 266 feet per minute.

Power: Choice of gasoline or Diesel.



OTHER MODERN PARSONS TRENCHLINERS

Model 250 Trenchliner (Ladder Type)

Depth: 12'

Widths: 16" to 42"

Model 310 Trenchliner (Ladder Type)

Depth: 15'

Widths: 18" to 54"

THE PARSONS COMPANY

KOEHRING SUBSIDIARY NEWTON, IOWA

TRENCHING EQUIPMENT



(Continued from page 154)

laneous work on the project. These units ranged from 1 1/4- to 3-cu.yd. capacity.

Personnel

The organization responsible for successful prosecution of the work for the Transit-Mix Concrete Corp. consisted of personnel of long experience in the ready-mixed concrete industry in New York City. In addition to the writer, who served as vice president and general manager, the supervising personnel included Arthur J. Wright, general superintendent; Martin McCann and Edward Egan, plant superintendents; and Charles Garrison and Charles Brucia, shop superintendents. Mrs. Harriett Felleman and Mrs. Thelma K. Bates handled all office details. Maintenance of both Plant No. 1 and Plant No. 2 was under the direction of Harold Anderson.

Success of the operation was greatly facilitated by the cooperation and assistance of the U. S. Engineers, Manhattan District, and of the Stone & Webster Engineering Corp., the J. A. Jones Construction Co., and E. I. duPont de Nemours & Company, prime contractors to whom concrete was furnished. Grateful acknowledgement is made to the Engineers and to the contractors.

Shunk *Snow Plow* and Ice Removal **BLADES**

Proved record of superior performance. Made of specially developed steel to withstand severe service conditions.

FOR ALL TYPES AND MODELS OF SNOW PLOWS Various widths, lengths, thicknesses--flat or curved--standard or special--punched ready to fit your machine.

SHUNK SAW-TOOTH ICE BLADE

Amazingly effective. Thoroughly breaks up and removes heavy, slippery ice and snow formations. Replaces all types of snow plow blades or maintenance units. Write for Bulletin and name of nearest Distributor.

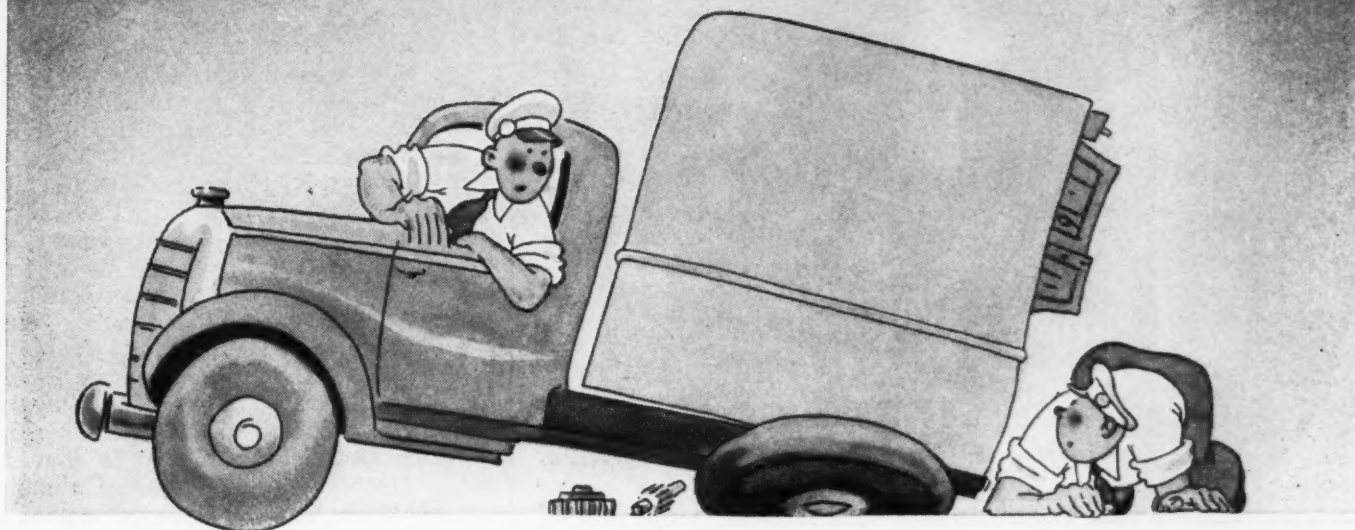


Shunk

MANUFACTURING COMPANY

ESTABLISHED 1854
BUCYRUS, OHIO

YOU CAN'T DO YOUR JOB RIGHT WITHOUT THE RIGHT TRUCK FOR YOUR JOB



"Listen, wise guy! You put that load on — now, help me jack it up!"

Many vehicle operators have learned the hard way that adding heavier springs or strengthening the frame of a truck doesn't make a heavier truck.

To insure peak performance and more profit, a truck must fit your job. A misfit truck may be the most expensive vehicle you can buy.

It is important that you get the right type of unit—conventional or cab over engine, straight truck, 6-wheeler or tractor-trailer, right size and type of body, correct wheelbase length, ample tire size, right type of axle—conventional or two speed—and the right axle ratio.

Protect your investment these 3 ways

When buying new vehicles: (1) Analyze the job that each vehicle must do; (2) Study specifications and buy your vehicles to fit your jobs; (3) Encourage good maintenance and careful operation. If you'll do these 3 things, you'll get better service and make more money.

Vehicle manufacturers are putting forth their best

efforts to deliver to you new and better vehicles in ever-increasing numbers to meet all your needs. Timken Axle is co-operating to the fullest extent. We will be ready soon with the finest line of axles incorporating the greatest advances in the history of the axle industry.

Ask about the Axles when you buy. Be sure you get Timken Axles!



TIMKEN AXLES

THE TIMKEN-DETROIT AXLE COMPANY, DETROIT 32, MICH.
WISCONSIN AXLE DIVISION • OSHKOSH, WISCONSIN

EASIER — FASTER — CHEAPER

with
SYNTRON

GASOLINE HAMMER

PAVING BREAKERS

100% Self-Contained

No Air Compressor
and Hose
No Battery Box
and Cable
No Springs



BUSTING concrete
CUTTING asphalt
DRILLING rock
DIGGING shale and
clay
TAMPING—and a
host of other jobs.

Write for Bulletin No. 8-45

SYNTRON CO.

500 Lexington

Homer City, Pa.



Flat-Top Powder Magazines

(Continued from page 99)

the plywood sheets being reversed as required to maintain tight joints between panels. At the end of the fourth use, the contractors found it more profitable to put the panels to less exacting uses than to attempt to retain them on magazine construction.

Prior to construction of a magazine, the site was prepared by excavating muck with a dragline for a depth of 3 or 4 ft. to hardpan and placing 4 to 8 ft. of compacted clay-gravel fill. Once this preliminary stage of construction was completed, operations moved forward in accordance with the schedule and methods worked out under the direction of J. H. La Duke, general superintendent of the entire magazine area for the WHMS group, made up of Winston Bros. Co.; C. F. Haglin & Sons, Inc.; Missouri Valley Bridge & Iron Co., and Sollitt Construction Co., as noted in last month's article, which also listed the men in charge of the project for the four-firm combination. M. J. Senescall later succeeded Mr. La Duke.

Progressive Construction

By days, the construction of a magazine proceeded as follows:

First Day—On this day, a specialist crew performed five separate operations: (1) It excavated for the wall footings and fourteen column footings of the magazine in the compacted clay fill previously placed to grade; (2) it erected the outside forms for the monolithic floor slab and footings; (3) it set the reinforcing steel, amounting to 10 tons; (4) it placed about 210 cu.yd. of truck-mixed concrete by crane and bucket in the footings and 6-in. slab; and (5) it finished the floor surface with rotary floats, as shown by a photograph.

Second Day—On the second day, a shoring crew erected 4x4-in. shores and 4x6-in. stringers and placed on this falsework framing 2x10-in. planks to carry the plywood panels which would support the concrete roof.

Third Day—Another crew took over the work on the third day to erect the complete interior shell of plywood forms for the walls, columns and roof. Columns

(Continued on page 160)

WELLMAN

Williams BUCKETS

*Are Lighter, Stronger
Give Longer Service*

Now all Wellman Buckets are welded rolled steel construction. Clamshell, Dragline, and Custom-Built types— $\frac{3}{8}$ to 16 $\frac{1}{2}$ yd. capacities.

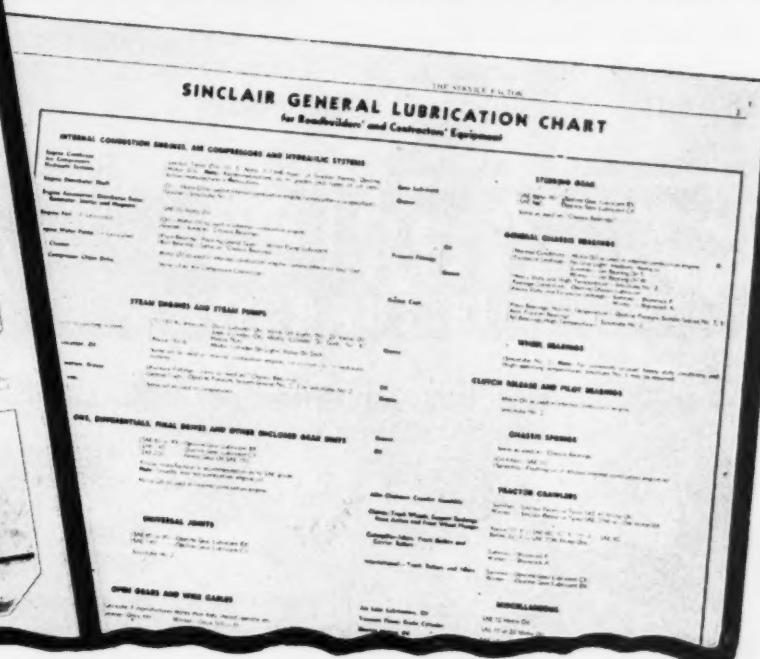
SEND FOR BULLETIN

THE WELLMAN ENGINEERING CO.
7017 Central Avenue • Cleveland 4, Ohio
Sales and Service Agencies in Principal Cities

Here's — — — — — SIMPLIFIED LUBRICATION for ALL Your Equipment...



THIS CHART TELLS YOU HOW



In helping to simplify lubrication for widely diversified equipment of the Armed Forces, Sinclair developed a system that eliminates headaches in the lubrication of roadbuilders and contractors' equipment. Sinclair Charted Lubrication makes it easy to set up simplified lubrication for *all* equipment.

Lubricant inventory is narrowed down to

a comparatively few, well chosen, generally available oils and greases. Errors of application can be minimized, lubrication and maintenance costs can be reduced, and life of the equipment extended.

Wouldn't the Sinclair Lubrication Chart be of valuable aid in your operations? Write for copies—no charge.

SINCLAIR LUBRICANTS-FUELS

FOR FULL INFORMATION OR LUBRICATION COUNSEL WRITE SINCLAIR REFINING COMPANY, 630 FIFTH AVENUE, NEW YORK 20, N. Y.



Although the war is over and essential war production is gradually being curtailed, Sterling is still in no position to ship wheelbarrows for civilian use. Probably several months will elapse before we will again be able to supply our regular customers. In the meantime, we trust you will bear with us . . . utilize the Sterlings in your possession . . . make them do "double duty", if necessary.

STERLING WHEELBARROW CO., Milwaukee 14, Wis.



Look for this Mark of
STERLING Quality

Sterling
WHEELBARROWS

CLIP THIS ADVERTISEMENT

Send for literature on items checked

☐ Gas or Electric Concrete Vibrators to meet every placing requirement

☐ Concrete Surfacing Attachments for all needs

☐ Full line of Flood and Shovel Lights (not illustrated).

☐ Vibratory Concrete Finishing Screeds—Models: VS-6 ft.; VS-10 ft.; VS-13 ft.; VS-16 ft.; VS-20 ft.; VS-25 ft. and 26-ft., adjustable for lengths—strike off and compaction in one easy operation.

☐ Electric "Power Blow" Hammer or Spade and Tools for heavy or light duty work.

☐ "TURN-A-TROWEL"

☐ Portable AC or DC Gas Electric Generator Sets to meet all power, lighting requirements, 1/2 to 17 KW. Open or housed models.

**SPEED YOUR WORK . . .
SAVE MANPOWER . . .
with Master Equipment**

"PREFERRED THE WORLD OVER"

Power, portability, simplicity and built-in dependability distinguish all Master Vibrator Company equipment . . . make it the choice of thousands of engineers and contractors wherever work must be done fast, efficiently and at lowest operating and manpower cost. **Immediate delivery.**

Write for literature at once!

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Distributors throughout United States, Canada and other countries

Products include: Portable Gas-Electric Generator Plants, 500 watts to 17,000 watts, Voltage Regulators and Portable Mountings Optional • Master Flood and Shovel Lights • Concrete Vibrators (Gas or Electric) High Speed Tools and Concrete Surfacing Attachments • Big 3—Generators and Tool Equipment • Concrete Vibratory Finishing Screeds • Concrete Troweling Machines (Gas or Electric) • Electric Hammer and Spade, Hammer Tools • Pavement Breaker and Tie Tamper • Back Fill Tamper and Tie Tamper • Grinding Machines and Tools • Electric Hoist (Export Only).



(Continued from page 158)

are square, with splayed tops and drop heads.

Fourth Day—By the fourth day, the formwork was ready for the reinforcing crew to set all superstructure steel, 34 tons, a task which was completed that day.

Fifth Day—A separate form crew took charge on the fifth day and erected all exterior wall forms and bracing.

Sixth Day—In 5½ to 6 hr. on the sixth day, the concrete crew placed 322 cu.yd. of truck-mixed concrete, using two cranes to handle buckets, two double-gate floor hoppers set on the roof deck at the high (front) end of the magazine, and about 16 buggies for wheeling over roof runways to points of placement. The front of each magazine is 15 ft. high, 2 ft. higher than the rear, for drainage after the structure is buried. By putting the hoppers at the higher end, the laborers were able to wheel loaded carts down grade and return empties upgrade.

Seventh Day—In the warm Arkansas climate, wall and column forms were stripped on the day following placement of concrete, and the concrete was primed for curing and protection from the sun.

Tenth Day—On the fourth day after concrete had been placed, the stripping crew removed the deck forms under the roof slab.

Final Operations

Other operations also followed a strict schedule; the specialist crews performing them had to keep up with the progress of the building crews. Following the form-stripping crew, a specialist group placed the footings for the wing walls and platform, another crew built the curtain wall for the platform, and a third erected wing-wall forms. Concrete in the wing walls and platform was placed by the same concrete crew which worked on the superstructures of the magazines.

Concrete in the magazines and appurtenant structures was designed for a minimum compressive strength of 2,500 psi. at 28 days. All concrete was vibrated internally inside the forms by flexible-shaft vibrators, and very little finishing was required when the forms were stripped.

Walls of the flat-top magazines are 10 in. thick at the two sides and in the rear, but the front wall is 14 in. thick. Thickness of the roof slab is 7 in.

Waterproofing of the magazines and covering with earth followed the other operations in proper sequence. Hot pitch and several plies of cloth membrane were used for the waterproofing. Earth cover was handled by dragline and sloped by tractor-bulldozer, as indicated in a photograph.



LIMA

with "Precision" Air-Control

type 1201



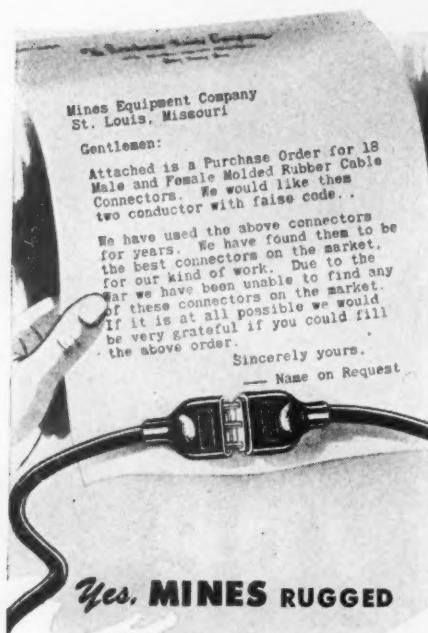
High-speed production is the keynote of this post-war construction era. Big output must be maintained hour after hour without operator fatigue. It is possible to meet this requirement with the LIMA Type 1201 shovel, crane and dragline because all principal operating clutches are controlled by air. The clutches are extra large in diameter, easy to operate, and are free from constant adjustment. If you need a $3\frac{1}{2}$ yard shovel, a 65 ton crane, or a dragline, write for a copy of bulletin 121-B and learn more about the many advantages that are to be had with the LIMA Type 1201.

LIMA LOCOMOTIVE WORKS, INCORPORATED
 SHOVEL AND CRANE DIVISION - - - LIMA, OHIO, U.S.A.

SHOVELS
 3/4 YARD TO 5 YARDS

DRAGLINES
 VARIABLE

CRANES
 13 TONS TO 100 TONS



**Yes, MINES RUGGED
MOLDED RUBBER
CONNECTORS
ARE ONCE AGAIN
AVAILABLE TO YOU!**

Now that military demands no longer completely tax our production facilities, we are able once again to supply Mines Molded Rubber Cable Connectors to all industry.

Mines Connectors when molded to electric cable become a part of the cable itself, giving a safe, efficient, water sealed connection. Mines Connectors can be furnished for splicing to cable in your own plant or molded to specified cable lengths.

Our engineers will gladly work with you in solving portable cable applications. Mines Connectors are available in single or multi-conductor, on capacities up to 5000 volts and 325 amperes.

For efficient, safe, flexible electric power transmission by cable, use Mines Connectors — "The Connector With The Water Seal."

WRITE FOR BULLETIN MC-106, showing many successful applications of Mines Connectors throughout industry.



Distributor On Railroad Car

(Continued from page 103)

from a gondola car attached by cable behind the distributor car in the work train. A tank car just ahead of the distributor unit in the train supplied the hot asphalt.

During the first part of the job, the penetration application was made with a hand spray hooked up to the distributor. Toward the end of the ½-mi. installation, the spray bar was attached to the distributor, and the remaining asphalt, both for penetration and for the entire seal coat, was applied with the bar. This improvement speeded the work and demonstrated that the crew could complete ½ mi. of track per day, using the distributor's spray bar to make both applications of asphalt and the gondola car in the work train to spread keystone and fine aggregate.

The experimental application was made 2 years ago. It has given reasonably satisfactory service but shows signs now indicating the desirability of heavy sealing with soft asphalt.

★ ★ ★

Dismantled Army Camp

(Continued from page 102)

shears for trimming asphalt roofing and shingles. Prisoners are used as truck drivers, but all other heavy equipment is operated by civil service employees.

Shortage of Hand Tools

Fashioning of hand tools, clawbars and crowbars, by prisoner blacksmiths from iron stock found at the camp solved an acute shortage problem. They supplied the necessary common hand tools and went on to develop special tools such as thin clawbars designed to remove cement-

(Continued on page 164)

Ready to Pour Concrete Forms for Piers or Columns



Sonotube
Laminated Fibre
Concrete Pier & Column Forms

6 Standard Sizes

Up to Twenty-Four Feet Long

INSIDE DIAMETER					
8"	9"	10"	11¼"	12"	13½"
SQUARE INCHES					
50.26	64	78.54	100	113.1	144

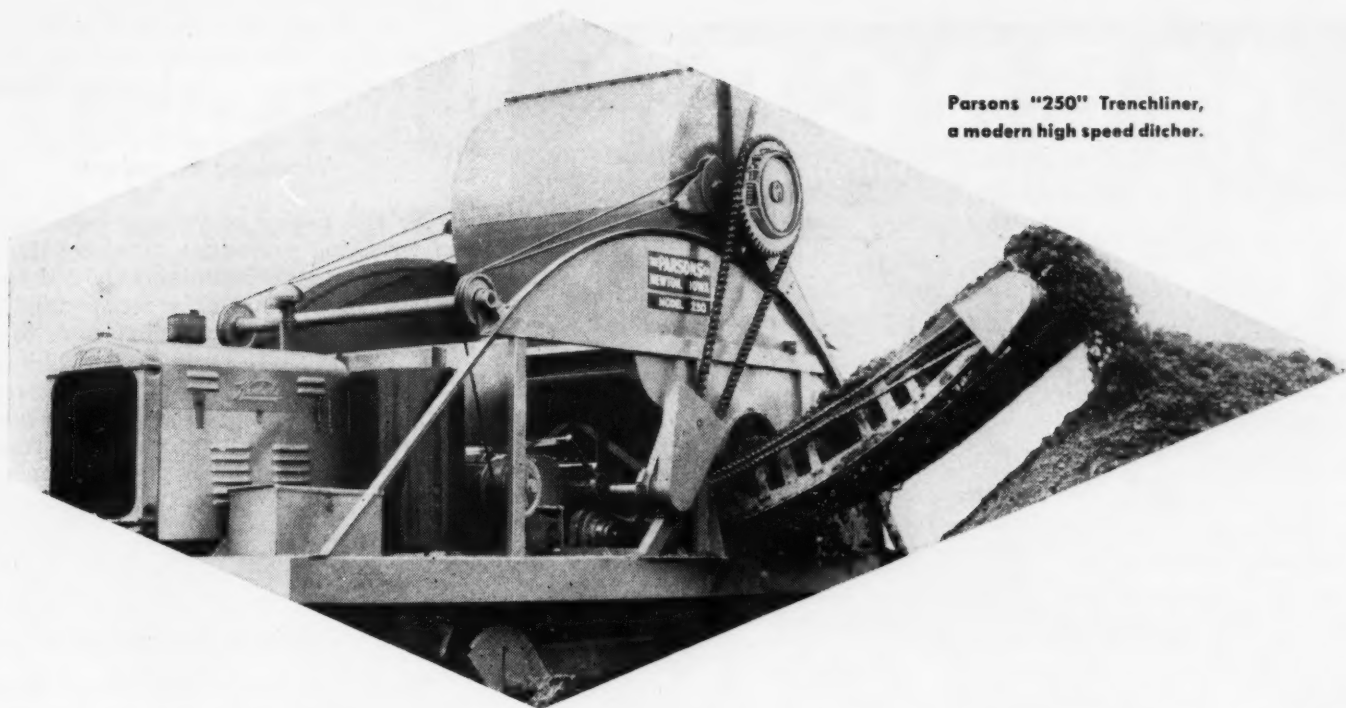
Smaller sizes available.

SONOTUBE Concrete Pier and Column Forms are priced for one-time use—to Save Time, Labor, Lumber and Money. Cut to desired lengths (heights) on the job. Minimum bracing required.

WRITE FOR DELIVERED PRICES

Immediate Delivery

SONOCO PRODUCTS COMPANY
HARTSVILLE, S. C. MYSTIC, CONN.
ROCKINGHAM, N. C. GARWOOD, N. J. LOWELL, MASS.



Parsons "250" Trenchliner,
a modern high speed ditcher.

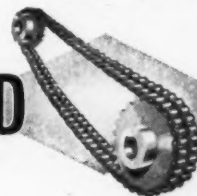
WHERE DIGGING IS DONE DIAMOND DRIVES HELP DO IT

- Like the foremost makers of earth moving and excavating machinery—the specialists in ditch digging select DIAMOND Roller Chains, too.

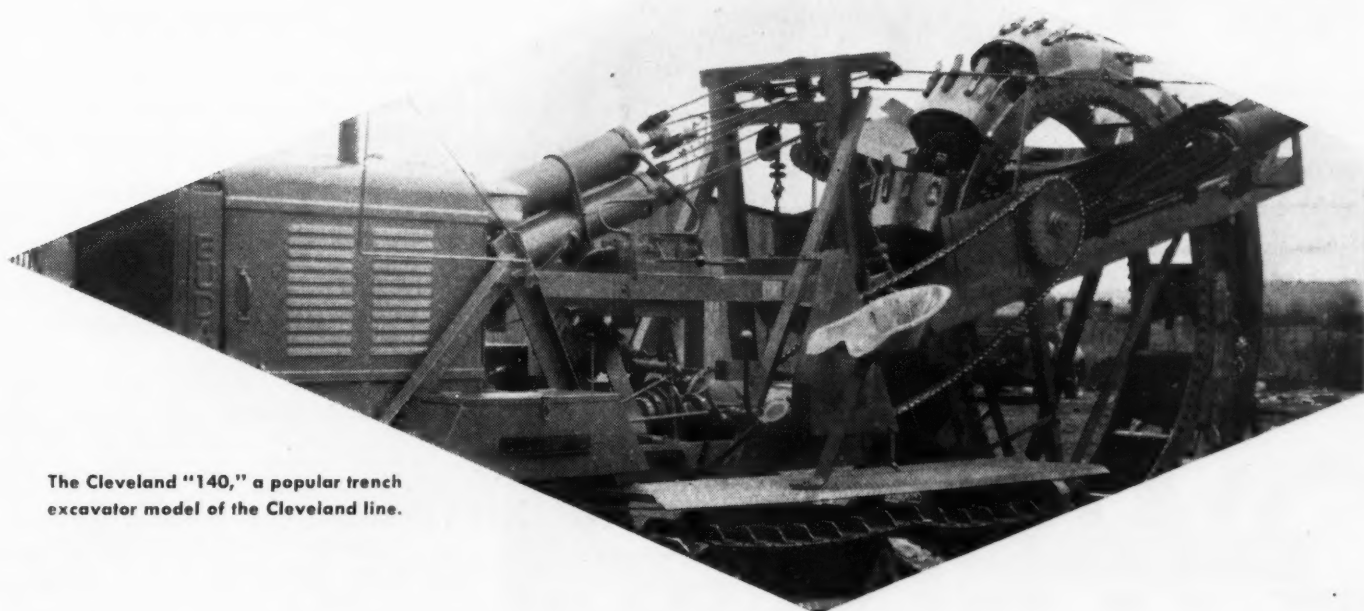
For traction, boom hoist, and soil conveyor—wherever drives are required, the long life dependability, the great reserve strength, the inherent elasticity to withstand shock loading and tough usage are qualities that recommend DIAMOND Drives to machinery designing en-

gineers. To operators, such drives mean more production with minimum attention and delay. DIAMOND CHAIN & MFG. CO., 418 Kentucky Avenue, Indianapolis 7, Indiana. Offices and Distributors in All Principal Cities.

DIAMOND



**ROLLER
CHAINS**



The Cleveland "140," a popular trench
excavator model of the Cleveland line.

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Material Handling Equipment



"THE NAME THAT CARRIES WEIGHT"

Utility Carts

Tool Wagons, Dump Carts,
Conveyors, Trailer Trucks,
Wheel Tractor Cranes . . .
Material Handling Equip-
ment of every type. De-
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whose reputation is founded
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Inquiries invited!

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Long on POWER
PERFORMANCE

Owen Bucket design trans-
lates power into exceptional
digging ability giving "a
mouthful at every bite" for
which these buckets are
famous.



The OWEN BUCKET Company

6020 Breakwater Ave. — Cleveland, Ohio
Branches: New York, Philadelphia, Chicago, Berkeley, Cal.

OWEN
BUCKETS
A MOUTHFUL AT EVERY BITE

(Continued from page 162)

asbestos shingles without breaking them, and a shears for cutting roofing material down to shingle size.

Wrecking Procedure

As the result of various experiments in wrecking procedure, tried by the various area superintendents, it was found best to divide the labor force into functional gangs, each of which were to follow through from building to building to perform the same task. The first crews strip out the electrical work and the next crews remove the plumbing. Concrete floors in the lavatories are broken up with pneumatic tools. Windows and doors are removed intact, with frames, glass, screens and hardware later crated for shipment.

Buildings Dismantled

Two methods are used for dismantling the buildings; some are cut into panels and match-marked for erection elsewhere, others are completely disassembled, piece by piece. For complete disassembly, the roof shingles are stripped off and slid to the ground in chutes, the underlying roofing felt is removed and rolled up and the roof sheeting and rafters are taken off. Meanwhile, a crew starts pulling off the cement-asbestos wall shingles with a special prisoner-made claw tool which can be driven under the nail head without breaking the shingle. These crews work from scaffolds hung from window jacks and the shingles are passed to the ground by hand to prevent breaking.

Warehouses and other large structures often have 95-lb. slate-asbestos roll roofing, instead of shingles, which cannot be rerolled but can be salvaged by handling in flat sheets that are cut up later into shingle size.

Flooring Removed

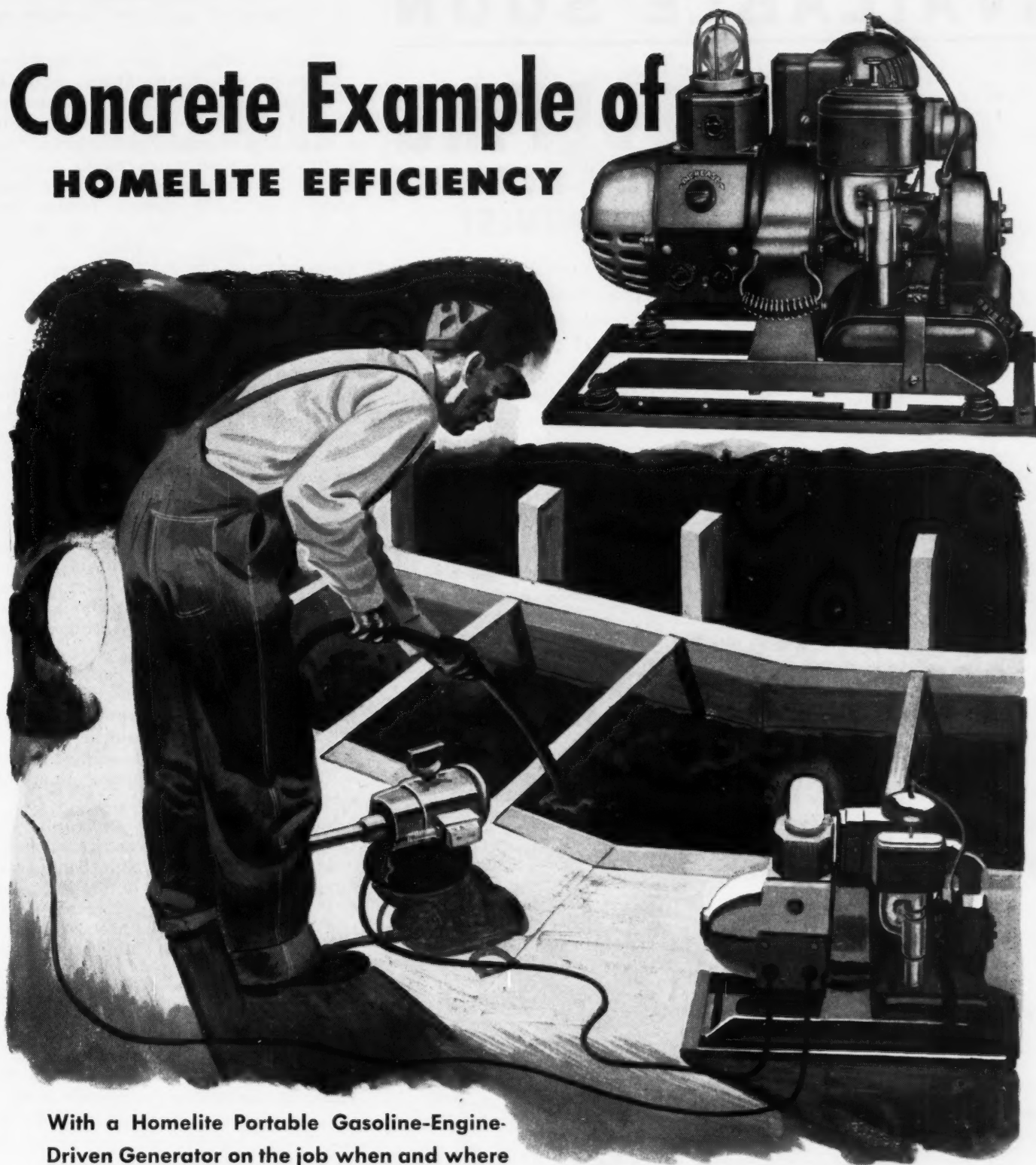
After the floors have been taken up, the wall and floor framing is removed. Hardwood flooring is salvaged completely by pulling the nails through the wood with special-grip clawbars after prying the flooring loose. Asphalt tile flooring is steamed loose, pried up and cleaned at once in a hot solution.

Miscellaneous Items

Boilers, unit heaters, kitchen equipment, fans, motors, roof smoke jackets and the like are removed early in the schedule. Brick wall stacks are pulled over, then broken up. All of the brick from these stacks is cleaned and salvaged as is also the brick from the warehouse fire walls. Cinder block foundation walls

(Continued on page 166)

Concrete Example of HOMELITE EFFICIENCY



With a Homelite Portable Gasoline-Engine-Driven Generator on the job when and where you want it, you have all the power you need to operate not just one but several electric vibrators. Also, for night pours, you can operate brilliant floodlights from the same Homelite at the same time that you are running your electric vibrators.

The best way to see the performance that you get with Homelite Portable Generators, Pumps and Blowers is to have a demonstration given right on an actual job. If you want a free demonstration without obligation, simply write to us. We'll have our nearest representative get in touch with you.

Homelite Corporation
Portable PUMPS • GENERATORS • BLOWERS
PORT CHESTER, NEW YORK

AVAILABLE SOON



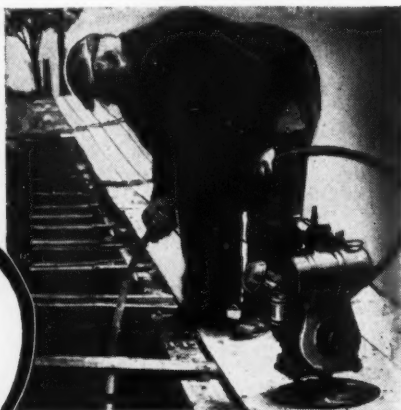
COFFING LIFTING and PULLING EQUIPMENT

Will soon again be available for your production, construction and maintenance jobs. After almost four years of day and night production for the Armed Forces we are now in position to accept and schedule your orders. We are proud of the production record we have made and of the important part COFFING products played in helping to restore Peace on Earth. Our standard line of hoists were used by our fighting men so there is no reconversion period for us.

Write for Folder No. D4

COFFING HOIST COMPANY
Danville U. S. A. Illinois

Save Money
Material
Manpower



with a *Mall*
REG. U.S. PAT. OFF.
VIBRATOR

A SIZE AND TYPE FOR EVERY JOB

No time, material or labor is wasted when concrete is placed with a Mall Vibrator. It places more concrete than any other vibrator of the same size. It permits the use of stiffer mix—economizing on sand, water and cement. It assures a stronger, watertight job, free from honeycombs and voids. Variable speed gasoline engine also operates 8 other quickly interchangeable tools.

1½ H.P. Gasoline Powered model available, also 3 H.P. round base or wheel barrow mounting, 1½ H.P. Universal Electric, and 7500 r.p.m. Pneumatic Units.

Ask your distributor for Mall Concrete Vibrators, MallSaws, Mall Chain Saws and MallDrills or write for literature and prices.

MALL TOOL COMPANY, 7757 South Chicago Ave., Chicago 19, Ill.



Mall
REG. U.S. PAT. OFF.

**PORTABLE
POWER TOOLS**

(Continued from page 164)

in the hospital area are likewise salvaged.

Fire hydrants and risers are uncovered and pulled out by backhoes. Soil pipe is removed and saved with connections intact. Deep-well pump units, transformers and other items of heavy outdoor equipment are salvaged, rehabilitated and shipped out as complete items. Already more than 2,800 electric motors have been saved. Insulation on the hospital corridor steam lines is removed and rolled up prior to dismantling the lines.

Materials Salvaged

As is the case with the wrecking procedure, there is no precedent to follow in the all-important salvage of wrecked materials, but the Camp Hale job has set a pattern that might well be followed on similar projects.

Nails are pulled from the lumber at the building site, swept up and salvaged for scrap. Because of numerous punctures from scattered nails and wire—as many as 86 in one day—Capt. Howard developed a road magnet which is now used to good effect in clearing all haul roads.

Rehabilitated lumber can be classed as No. 1 grade. Saw lines are set up at points convenient for stacking and loading for shipping. The lumber is cleaned and squared, split ends being removed in the saw lines, retaining maximum standard lengths.

Scrap lumber which accumulates is being used to good advantage. Some of it is used in making boxes and crates for shipping salvaged items, but much of it is being made, on order, into pallets and boxes for the ordnance department. Up to July 1, orders had been placed for 270,500 boxes and pallets which would cost, according to ordnance contract prices, \$559,250. Most of these orders have already been filled at negligible cost. All unusable scrap lumber is to be sold to nearby towns as kindling. Since the percentage of usable scrap is low, an indication of the size of the job is had from the fact that bids have been taken on 2,400 tons of kindling.

Plumbing Fixtures

Plumbing fixtures and small piping are similarly handled. Piping is completely disassembled; all connections and fittings are removed and stored in classified bins. Large fixtures, such as toilet bowls and sinks, are boxed for shipment.

Unless an item is in good shape for re-use, or can be rehabilitated on the spot, it is scrapped. Everything that is shipped out to other jobs is in good, workable condition, properly tagged and

(Continued on page 168)

Beat cold engine sludge to the draw...use

Stanolube HD

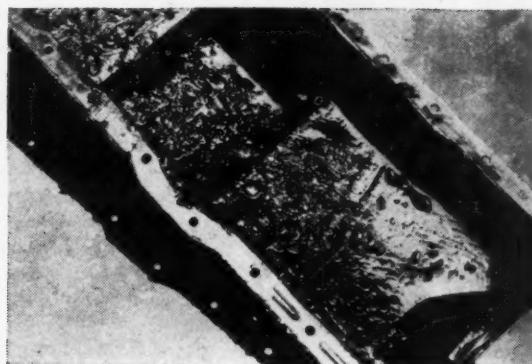
COLD WEATHER, that's just around the corner, will bring the usual flood of fleet problems caused by cold engine sludge. If your equipment must operate intermittently at low speeds and temperatures, there are two steps you can take now to reduce cold engine sludge to the minimum.

First, check or install thermostats to be sure proper water jacket temperatures are maintained. It may also be advisable to insulate oil pans and valve covers.

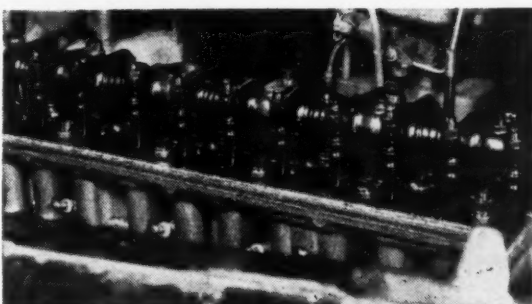
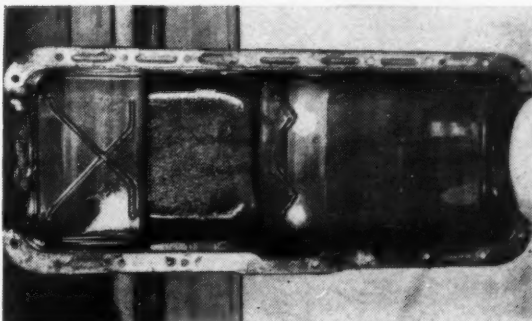
Second, switch to Stanolube HD. Fleet records over the past three years show that Stanolube HD is effective in eliminating cold engine sludge. There are two reasons. Stanolube HD virtually eliminates oil oxidation and its detergency helps remove sludge-forming deposits.

A Standard Oil Automotive Engineer will be glad to help you eliminate cold engine sludge troubles in your fleet this winter. Write now, to Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois, for the Engineer nearest you.

Buy and hold more Victory Bonds



Examples of cold engine sludge, using conventional type motor oil—in crankcase and valve compartment.

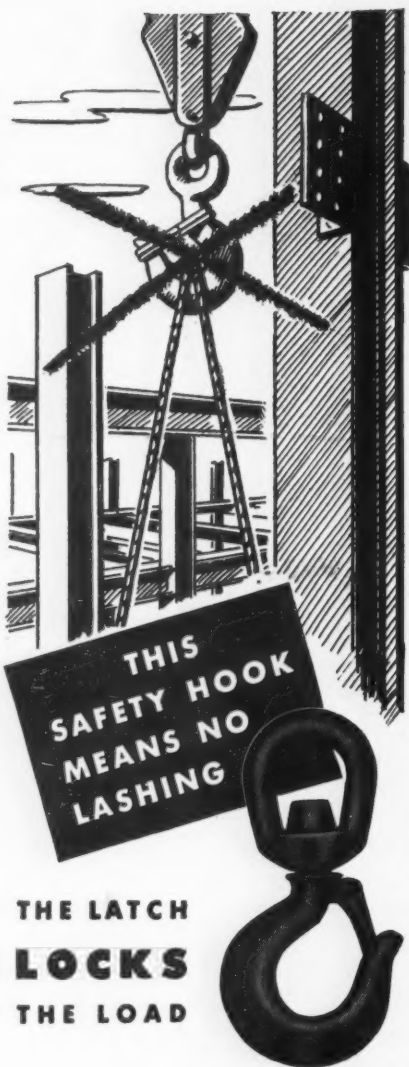


This overhead valve mechanism and crankcase are evidence of engine cleanliness. Stanolube HD was used during a period of low temperature intermittent operation which commonly produces cold engine sludge.

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When Laughlin's newly-designed latch — providing about 80% of an ordinary hoist hook's throat opening — replaces rope lashing for securing the load in the hook, you not only speed up the job but also make safety *certain*. That's because the men who are *supposed* to lash loads, but *often don't* are relieved of the responsibility.

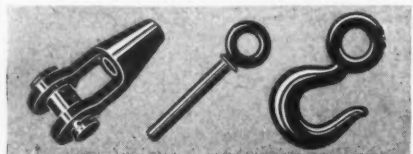
Get better acquainted with these sturdy, drop-forged, heat-treated, standard-type hooks... made safe by dependable latches and stainless steel springs... $\frac{1}{2}$ to 15 ton safe load.

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(Continued from page 166)

marked just as if it were a new shipment from a manufacturer.

According to the present schedule, the entire job will be completed early this fall, providing the size of the labor crews is maintained.

★ ★ ★

Factory Underpinning

(Continued from page 94)

ders. The fact that the 18-in. brick wall had been constructed on a concrete pile cap and subgrade beam 5 ft. 8 in. deep permitted considerable latitude as to the location of the cylinders. As indicated in Fig. 2, the cylinders were located north

(Continued on page 170)

YOU'LL ENJOY BIGGER PROFITS



Operating This New JOHNSON TWIN-SILO Portable 1600-Bbl. Cement Plant



If you need greater cement storage capacity than is provided by portable section bins, or a dutchmill, this new bulk cement plant offers you many practical advantages... It has the largest capacity of any Johnson portable plant (up to 1600 barrels)... and assures fast, economical handling of bulk cement for contractors' use.

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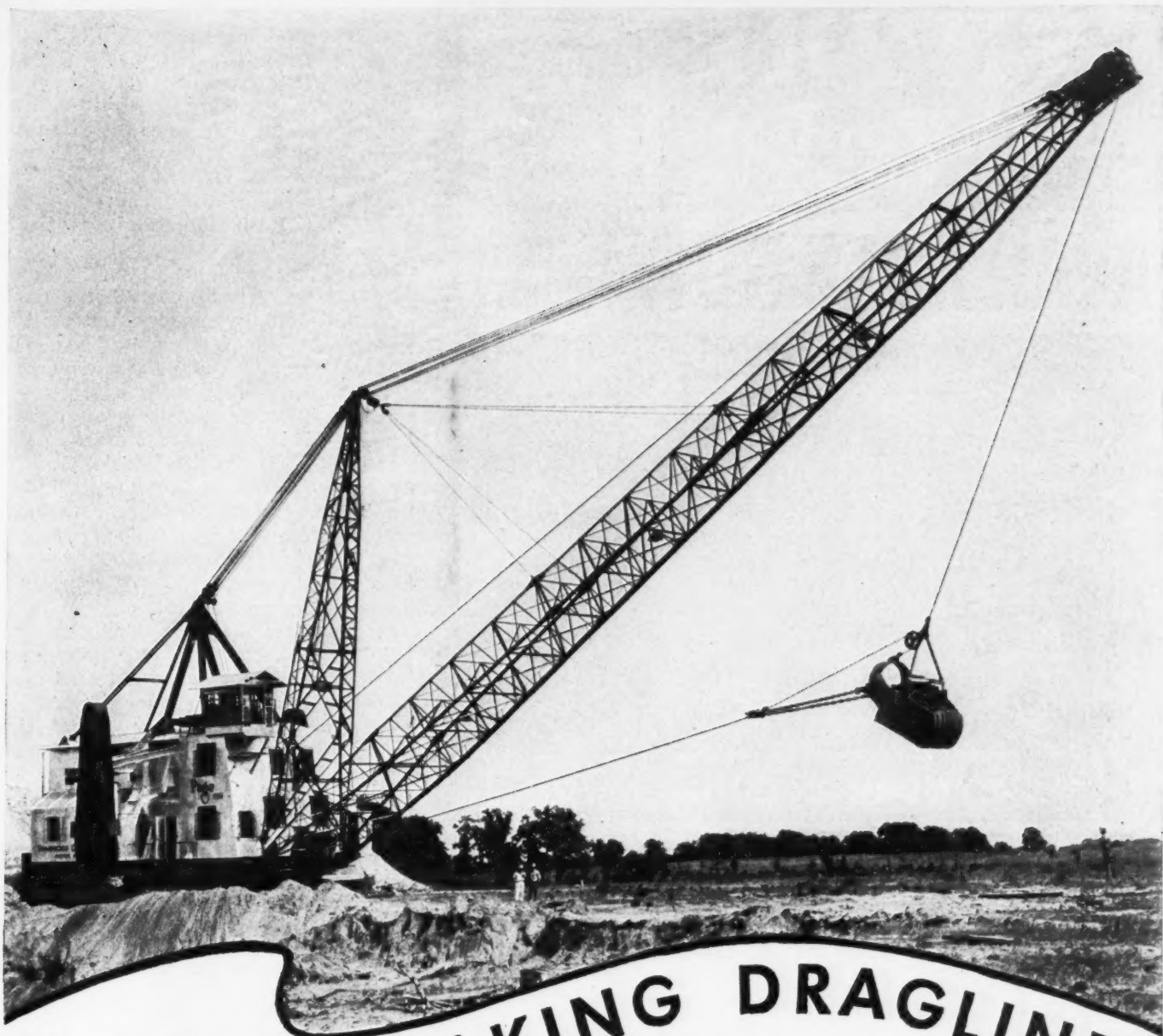
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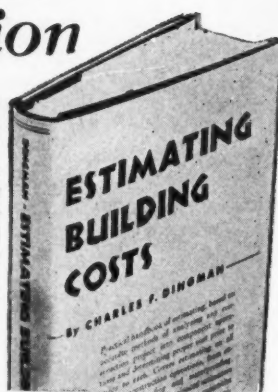
E. D. ETNYRE & CO., Oregon, Illinois

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Put this handy Dingman pocketbook to work, in making accurate estimates for building construction, in saving time and error in the job of determining profitable, competitive prices. Based on the most practical experience, it is full of helpful pointers for new or experienced estimators, shows how to determine quantities of labor and amounts of material to produce a unit of completed work in practically every branch of building construction.

Third Edition



ESTIMATING BUILDING COSTS

By CHARLES F. DINGMAN

Architectural Engineer

401 pages, 4 x 6 3/4, 27 illustrations, \$3.00

This practical guidebook of estimating trains the estimator to analyze every construction job into its component parts, to apply cost data, adjusted to living conditions, to the several operations necessary, and to calculate a price that will approach the actual cost of doing the work as closely as is humanly possible.

ESTIMATING BUILDING COSTS tells how to make an estimate on a wood, brick, or concrete building construction, and covers every operation from excavating to roofing and waterproofing — with valuable material on such important details as fireproof construction, shingling, steel sash, or cement gun work. Included also are a number of useful data tables, but its primary purpose is to give the step-by-step methods that will train the reader to become a thoroughly competent estimator. This book helps you to make sure that no element of the work is overlooked, and explains the special factors to watch in dealing with each type of work.

While essentially a book of methods, ESTIMATING BUILDING COSTS contains 227 data tables and other useful reference features for the estimator, such as a reminder list of job elements, and a number of practical mathematical formulas.

Practical features

- Covers earth handling and moving so fully that the data are applicable to building operations of practically any scope and size, also to other construction operations involving this work
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(Continued from page 168)

of the center line of the wall to counteract an outward deflection of the wall of about 3 in. between the second and third story. Before jacking operations started, 1½-in. round rods were installed at the second and third story ceiling levels to tie the outside wall to a heavy interior brick wall.

Pits 4x5 ft. in plan, 6 ft. below the bottom of the footings, were excavated and sheeted with 2x8-in. lumber to permit installation of the Pretest cylinders. The ground-water which entered a pit was removed by a Marlow gasoline driven Mudhog pump. Two pits were worked at one time. These were spaced as far apart as possible in order to minimize the loss of existing support to the wall at any one point. Hydraulic jacks 4½ in. dia., rated 40 tons at a pressure of 5,000 lb. per sq. in., forced the 16-in. cylinders into the ground. A hydraulic gage attached to the line which piped the water for activating the jacks from the high pressure pumps enabled the pit-man to know at all times the load on the cylinder. Cylinders were jacked in 4-ft. lengths and were connected by external sleeves formed by welding a 5-in. section of pipe to the top of each 4-ft. section. The joints were treated with a heavy asphalt mastic and oakum to make them water tight. Pipes were jacked until the gage indicated a load of about 40 tons, after which the interior of the cylinders were cleaned out to facilitate jacking.

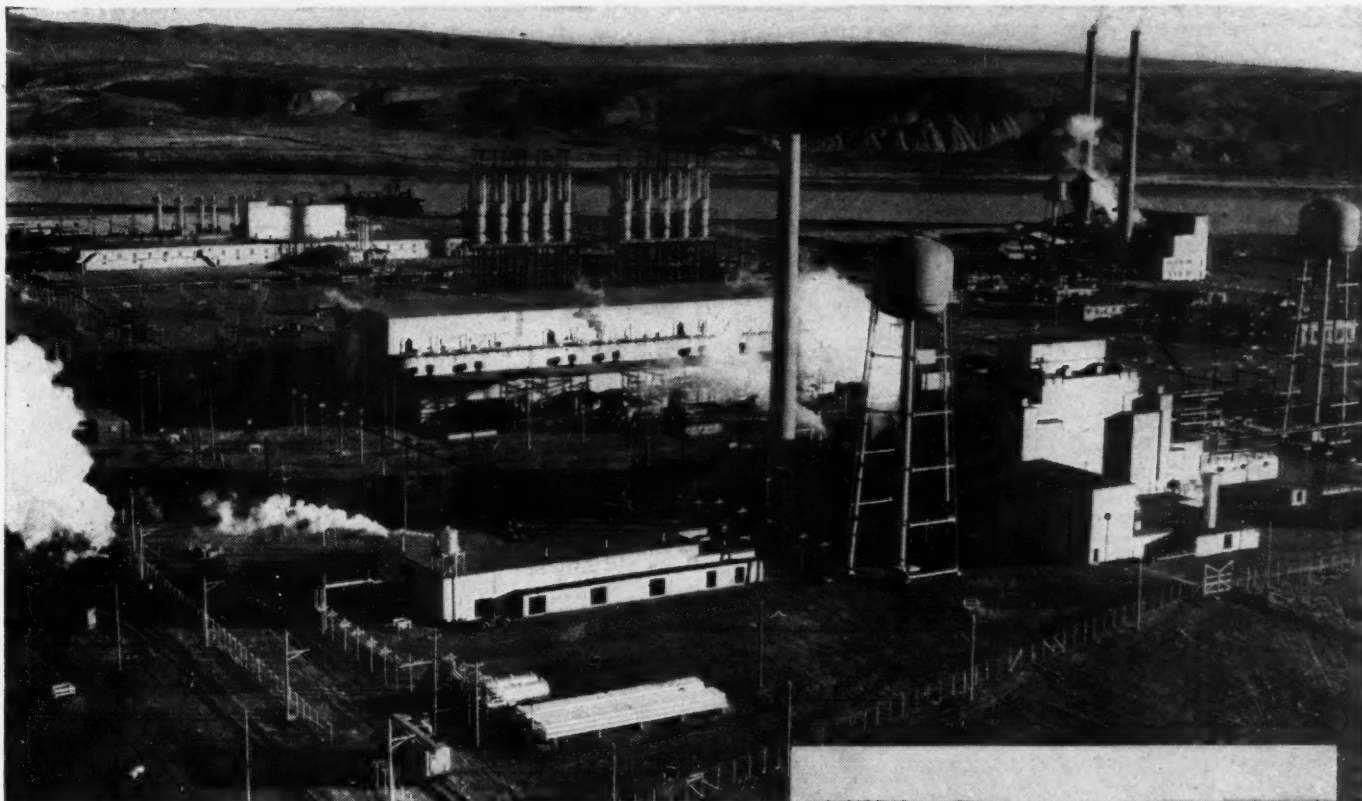
As long as the cylinders were in the clay stratum, they were cleaned by a Hayward midget orange-peel bucket only 12 in. in diameter. Sand was removed by jetting with water at about 80 lb. per sq. in. pressure. A lead-weighted nozzle on the end of a 1¼-in. hose was worked up and down at the bottom of the cylinder being cleaned out in order to stir up the sand so that it would be carried away by the flowing water. Care was taken to see that the jetting at no time was carried below the bottoms of the cylinders in order to avoid disturbing the material supporting the wood piles.

After the cylinders had been forced well into the stratum of sand they were cleaned out and their bottoms were sealed with 5 ft. of tremie concrete. Next day the cylinders were bailed out and concreted to the top in the dry.

Pretesting Cylinders

To prepare for pretesting a cylinder, a ¾-in. plate was placed directly over the cylinder and the irregular space between the plate and the bottom of the footing was drypacked with a moist mixture of sand and cement. Two 4½-in. dia. hydraulic jacks were set on a ¾-in. plate placed on the cylinder to be tested, with sufficient space between the jacks to per-

(Continued on page 172)



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(Continued from page 170)

mit placing the 12-in. strut which transferred the load from the footing to the cylinder. Both jacks were connected to a hand-operated hydraulic pump through flexible copper tubing. A hydraulic gage at the pump indicated the load on the cylinder at all times.

Before starting the test a level was set up for taking observations on the wall. The same level marks were utilized as were used to check the wall daily while the underpinning operation was in progress. As load was applied, the cylinder penetrated a little as a bulb of pressure was formed in the sand at the bottom of the pile. The load was carried to the amount desired and held until no penetration of the cylinder occurred, as evidenced by the fact that the gage on the pump held the pressure which was applied. Cylinders were tested to 90 tons, which corresponds to 50 percent more than the designed load.

The next step was to insert the 12-in. beam, which was used as a strut, and then transfer the load from the jacks to this strut by means of steel wedges. As the steel wedges were sledged into place the reading on the hydraulic gage dropped, indicating that the load was

(Continued on page 174)

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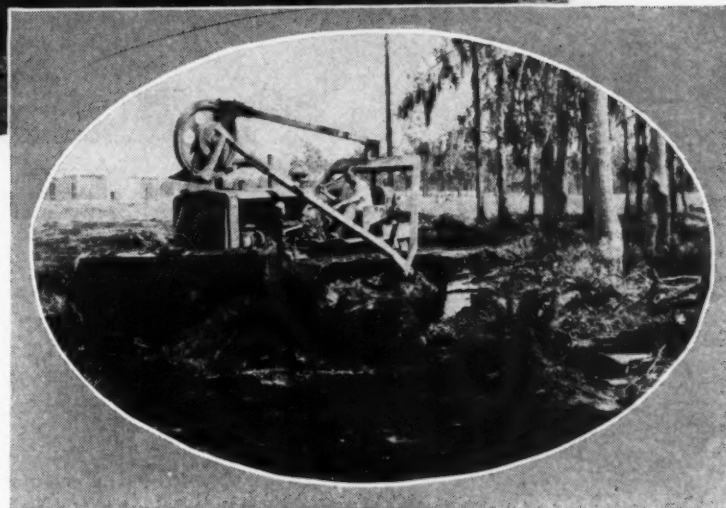
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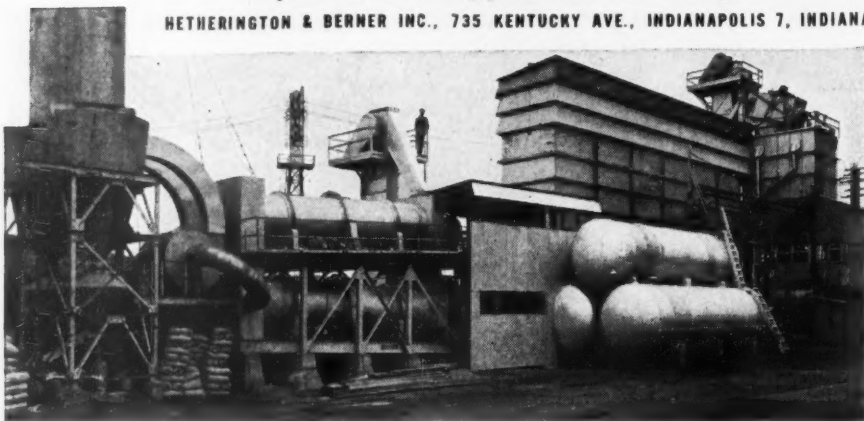
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(Continued from page 172)

being transferred from the jacks to the steel strut. Encasing of the struts in concrete was deferred until after the piling in Building 10 had been completed in order to permit retesting of the Pretest cylinders.

A third phase of the work performed at this time consisted of driving fourteen 10-in. closed-end Tuba steel cylinders to rock. These cylinders served the double purpose of supporting a group of new tanks and of preventing further settlement of the walls of Building 10. As indicated in Fig. 2, the load of the tanks and the building walls was transferred to the cylinders through a system of steel beams.

Specially Designed Equipment

For driving the cylinders inside Building 10 a piece of equipment was utilized which was specially designed to make such installations with maximum efficiency. Known as "tower leads," this equipment consisted of a skeleton hoist mounted on one end of a bed frame which carried a tower on the opposite end for lifting and guiding the piling-driving hammer. The tower was built as high as the 14-ft. headroom would permit in order to permit the driving of maximum lengths of cylinders. To gain additional headroom, lifting cables from the skeleton hoist, operating through a series of sheaves, were attached to two plates bolted about 4 ft. below the top of the hammer. This arrangement permitted the top of the hammer to be raised above the top of the tower leads in order to utilize all available headroom.

The tower leads were skidded from place to place over 8x8-in. timber by running a line from the hoist through a snatch block attached to some fixed anchorage. Air for the hammer and the hoist was furnished by the same compressor that furnished air to drive the piles in Building 8. Cast steel points and internal steel driving sleeves were selected with a diameter slightly larger than the inside diameter of the pipe. In the process of driving the cylinders to rock, a tight joint was formed through which no water penetrated. After the cylinders had been driven to refusal on the rock, they were cut off to grade and concreted.

Holes were cut in the masonry walls, following which the beam system was set in place and electric arc welding utilized to make connections from beam to girders and from girders to cylinders. As a final step, the holes cut in the masonry were concreted to permit the load of the building to be transmitted to the new foundation system.

The work described was completed in two months with no interruption to the owner's operations. The underpinning
(Continued on page 176)

Buckeye Trenchers *Make The Tough Jobs Easy*

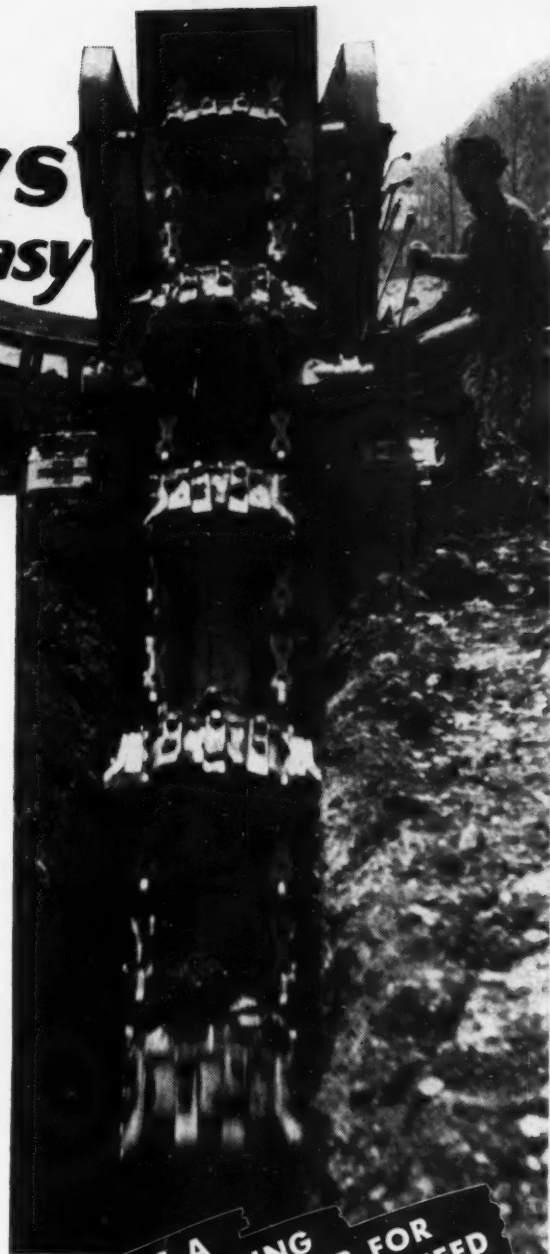
The reason so many successful contractors use Buckeye Trenchers is simple. They produce when the going gets tough! To make money on trenching jobs, you must be able to take the tough spots in stride, and Buckeye Ladder Type Trenchers do just that, cutting anything short of solid rock.

Take the Model 410, for example. Ruggedly constructed, it has twelve cutting feeds in each of three forward speeds—no matter what kind of material you strike, down to the toughest hardpan, you can put the 410 through it in the shortest possible time.

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New York 7, N. Y.

(Continued from page 174)

was designed and installed by Spencer, White & Prentis, Inc., of New York City, for whom Joseph Weaver was general superintendent; Albert DiGiacinto, engineer; and Michael Kenny, superintendent.

★ ★ ★

Breakwater at Guam

(Continued from page 88)

and wire rope slings. Cleats were welded to each shovel dipper stick in back of the dipper lip hinge, and between them two parts of cable were strung.

(Continued on page 178)

Clark
PORTABLE
ELECTRIC TOOLS

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ARMSTRONG BROS.
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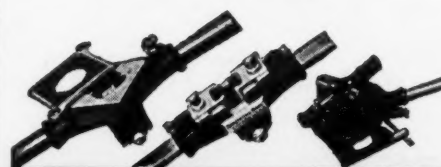
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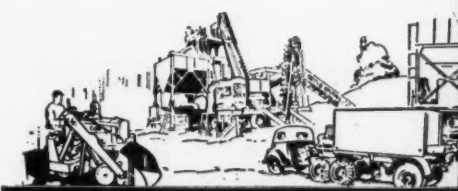
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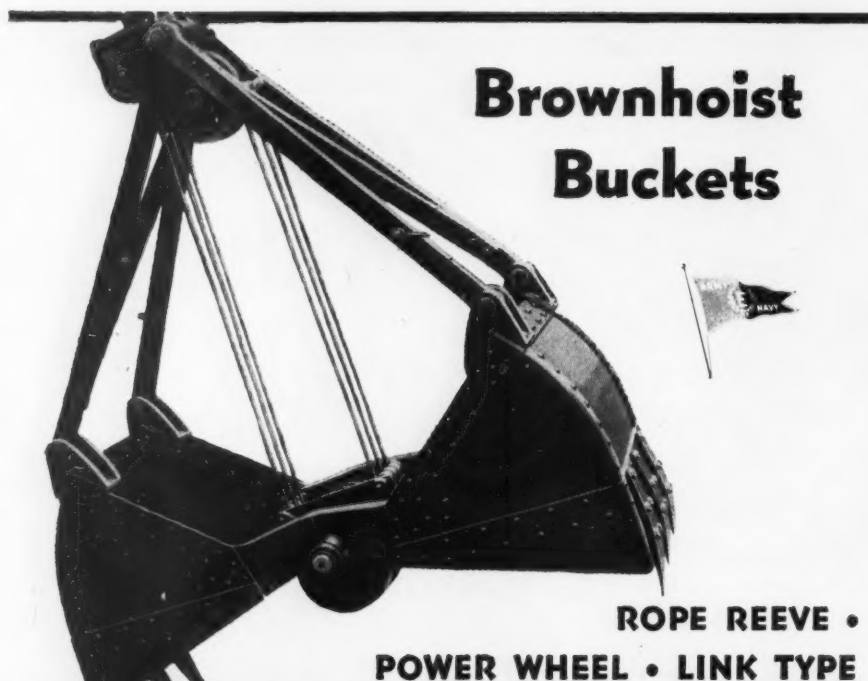
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Here is a thorough engineering treatment of the fundamental principles of design of reinforced concrete structures, giving an understanding of the nature and properties of concrete, explaining the fundamental theories of design, and demonstrating design procedure fully with detailed solutions of many actually existing practical structures.

The THEORY and PRACTICE of REINFORCED CONCRETE

By CLARENCE W. DUNHAM

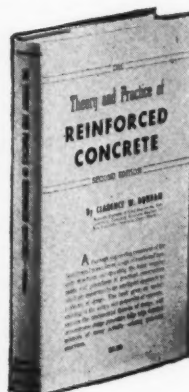
Associate Professor of Civil Engineering, Yale University; Consulting Structural Engineer for New York Engineering Office of the Anaconda Copper Mining Co., Second Edition, 558 pages, 5½ x 8½, 345 illustrations, \$4.50.

This book covers the theory and practice needed to visualize how each part of a reinforced concrete structure acts, to design these parts so that each one will perform safely the service for which it is intended, and to plan the operations in the field so that the entire work will benefit.

Features of the new edition

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- treatment of combination columns and pipe columns filled with concrete
- practical suggestions for the construction of long retaining walls with varying heights
- useful material for the design of rectangular spread footings with direct loads and overturning moments

This book gives the engineer extremely practical material in examples of design problems and constructional data taken from actual structures such as the Lincoln Tunnel, The George Washington Bridge, the Bayonne Bridge, etc., with which the author has had close association.



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... the chapter by W. B. Sinnickson, Engineer of Tests, Port of New York Authority, covering concrete materials, together with a detailed explanation of the manufacture, treatment, and properties of concrete itself.

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(Continued from page 176)

Easily spliced preformed wire rope was used for slings. It was found that 1½-in. 6x37 hemp center, preformed plow steel rope was safer, more flexible and had longer life than any 6x19 type tried.

Eyes spliced in each end of the slings by Seabees in the field were hooked together by a clevis, and each rock was rigged and picked up. Athey wagons were used for delivery.

A shovel has always worked better on this heavy duty because after a rock is loaded, the operator can push it around on the bed with his dipper stick. This was impossible earlier in the job, when a crane was used exclusively for the heavy loading. Moreover, the crane was making far too much mileage walking up and down the quarry to the different rock piles. By using shovels, any of the machines all along the quarry face can load Athey wagons wherever they stop.

Quarry-run rock is being end-dumped off the breakwater by Mack and Euclid trucks, and thus far six Athey tandem units, drawn by D-7's, have been able to keep up the building pace of faster units. The Seabees speeded their rubber mounted transportation considerably



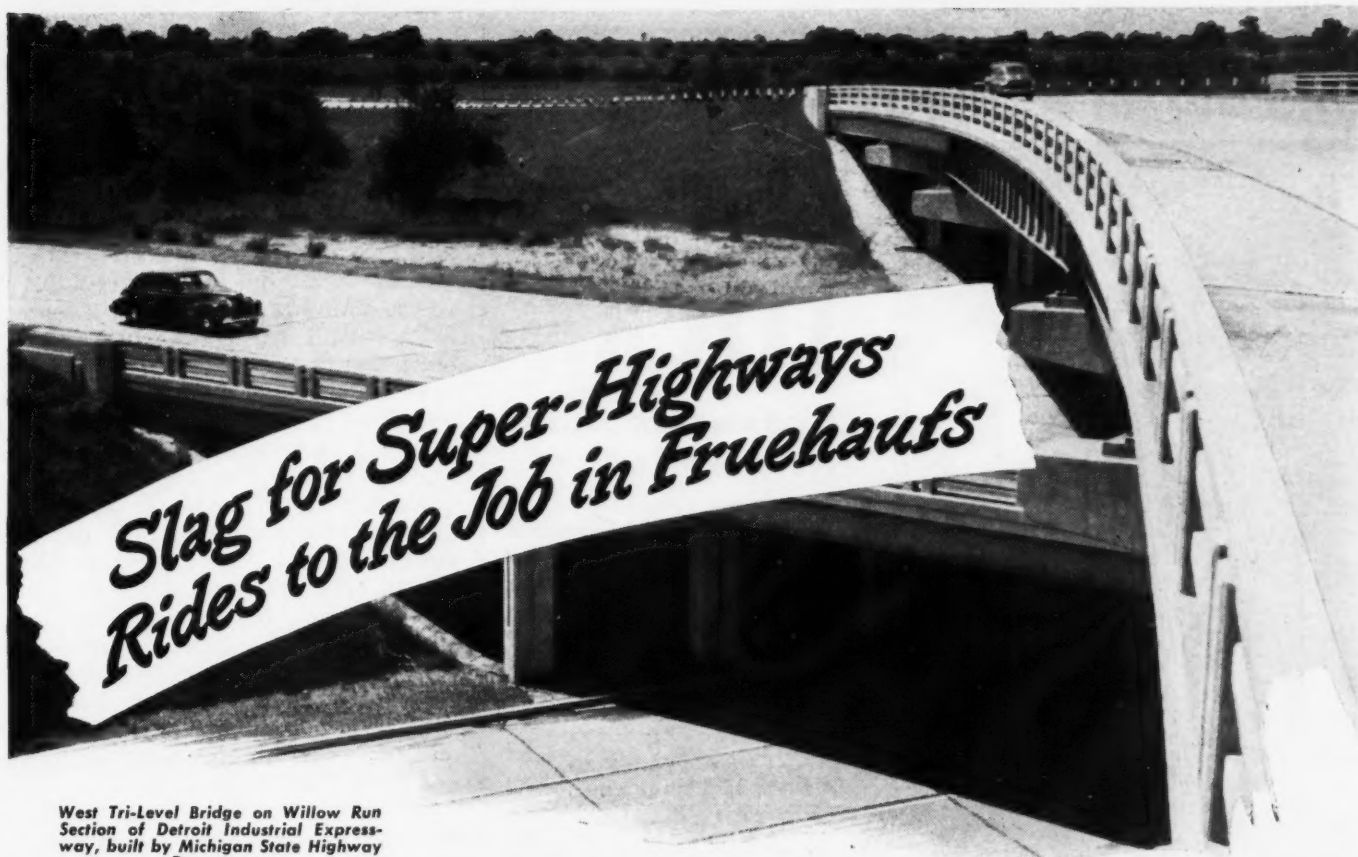
WAGON DRILLS, such as that working in background, put down holes which are loaded with 60 percent stick gelatin.

when they built a high speed highway out across the breakwater, using fine coral from a dredge dump nearby. This road is kept smooth by a daily motor grader workout. It is an interesting practical fact that 20 dumped loads make 1 lin.ft. of breakwater, working on Calalan Bank where the water is 30 ft. deep.

Men Against the Sea

The Seabees, as well as contractor's representatives in 1941, have seen what

(Continued on page 180)



West Tri-Level Bridge on Willow Run
Section of Detroit Industrial Express-
way, built by Michigan State Highway
Department.

56 FRUEHAUF DUMP TRAILERS HAUL 1½ MILLION TONS IN YEAR!

HAULING ALL of the blast furnace and open hearth slag from Great Lakes Steel Co. and Ford Motor Company steel mills, Ed C. Levy Co., of Detroit handles a total of 1½ million tons of slag per year.

Using a fleet of 56 big Fruehauf Dump Trailers, Levy delivers slag for street paving, resurfacing, concrete and asphalt work for the city of Detroit, Wayne County Road Commission and Michigan State Highway Department. In addition, he supplies practically all the rock wool slag used in the Detroit area.

MILLION TONS FOR WILLOW RUN EXPRESSWAY

Biggest job the firm has handled was the slag aggregate for construction of the Detroit Industrial Expressway, including the entire highway, approaches and bridges, as well as the runways, aprons, parking lots and roadways surrounding the mammoth Willow Run Bomber plant. Over a period of 20 months, Levy's fleet of Fruehaufs delivered a million tons of slag for this great project.

FRUEHAUFS SINCE 1928

Ed Levy discovered the advantages of the Trailer hauling method in 1928, when he purchased his first Fruehaufs . . . and quickly learned that any truck, like a horse, can *pull* in a Trailer, far more than it is designed to *carry*.

These Fruehaufs carry loads that average 24 tons, yet they are pulled by 5-ton tractors.

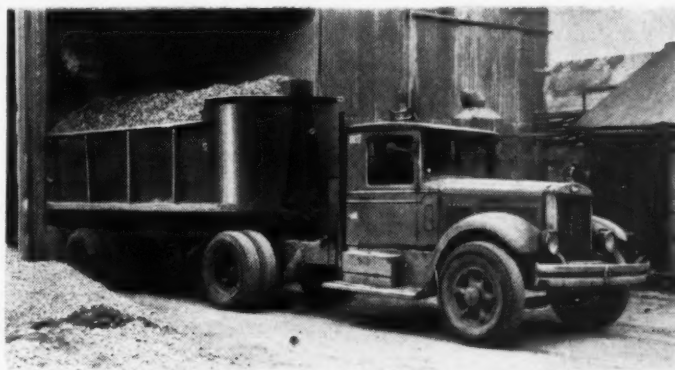
"It's the only way to haul heavy materials", says Mr. Levy. He will tell you that the first Fruehaufs he bought in 1928 are still in daily operation after more than a quarter million miles of heavy-duty service. Repairs have been limited to the simple replacement of a few pins and bushings.

When it comes to heavy hauling, remember, your best bet is Fruehauf!

World's Largest Builders of Truck-Trailers

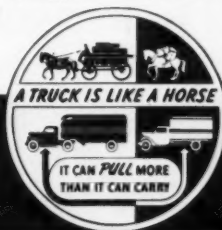
FRUEHAUF TRAILER CO., DETROIT 32

Service in Principal Cities



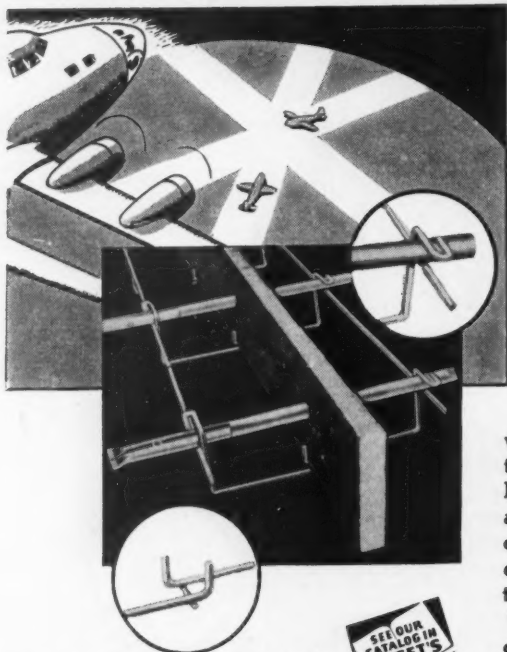
Big Fruehauf Trailer, pulled by a Mack tractor, is loaded with 24 cubic yards of slag aggregate from crusher at Ed Levy's plant.

FRUEHAUF TRAILERS



"Engineered Transportation"
REG. U. S. PAT. OFF.

Build Better Runways Faster with



"QUIK-LOCK"

Expansion Joint Assemblies

Because of the many advantages of "QUIK-LOCK" Expansion Joint Assemblies, they are widely used to speed up the construction of airplane runways and assure better jobs. Their special design assures easy positioning and locking of dowels, and accurate positioning of dowels parallel to each other and to the subgrade. Find out how "QUIK-LOCKS" can speed your construction and provide better joints at smaller cost.

Today... Write for Union Steel Products Catalog of Construction Accessories.

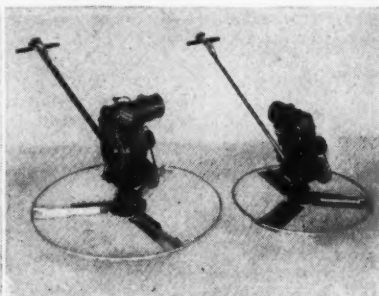
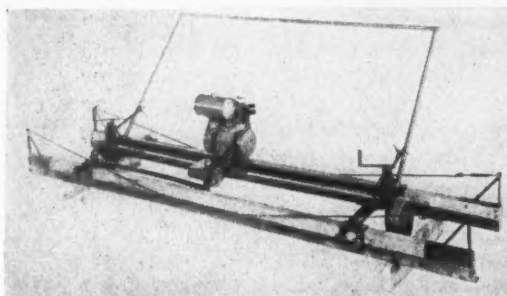


UNION STEEL PRODUCTS COMPANY

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3334 Danforth Avenue, Toronto, Canada

WILLIAMS WALLACE COMPANY
100 Hooper Street, San Francisco, Calif.



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For the
**Rodding
Floating
Finishing
of concrete slabs**

Saves money and time.
Eliminates back-breaking labor.
Produces perfect, level and smooth floors.

Write or Wire for Nearest Distributor

Whiteman MANUFACTURING CO.
3249 Casitas Avenue Los Angeles 26, California

(Continued from page 178)

wild power the Pacific can unleash. Twice within a year normal storms have rocked the rubble mound. When the contractors were making their studies in 1941 a 125-mph. gale lashed in and gave them something to think about. The only answer to this battle of men against the sea is strength—great strength. The ocean showed its might in October of 1944, when it moved and broke five concrete barges which had been sunk on the breakwater axis as a temporary means of protecting the harbor. It was intended to incorporate these barges in the breakwater, but the Pacific was too powerful. A typhoon at Palau rolled ground swells into Apra destructive enough to move the barges as much as 100 ft. off alignment. All were smashed and broken by the force of the sea.

So the Seabees have widened the breakwater section over that proposed by contractors, have gone up 9 ft. higher than +15 elevation originally planned, and they have hauled a lot of the really big stones, up to 25 tons.

The accompanying list of "equipment on order" is what the Seabees are hoping for, day by day. If the Seabees can fit in heavy slope and cap rock, they believe they can develop the necessary strength on the outer side of the breakwater to stand the worst punishment the Pacific can give.

The job is being directed by Commo. W. O. Hiltabidle, Jr., USN officer in charge of Guam's naval construction brigade; Comdr. E. B. Cavallo and Lieut. Comdr. J. S. Glunt, of the construction regiment; and Comdr. F. L. Endebrock, officer in charge of the naval construction battalion handling the project. Lieut. W. C. Wing and Chief Carpenter James Harris, both of this same battalion, are in charge of the field work.

Equipment Assigned to Apra Breakwater

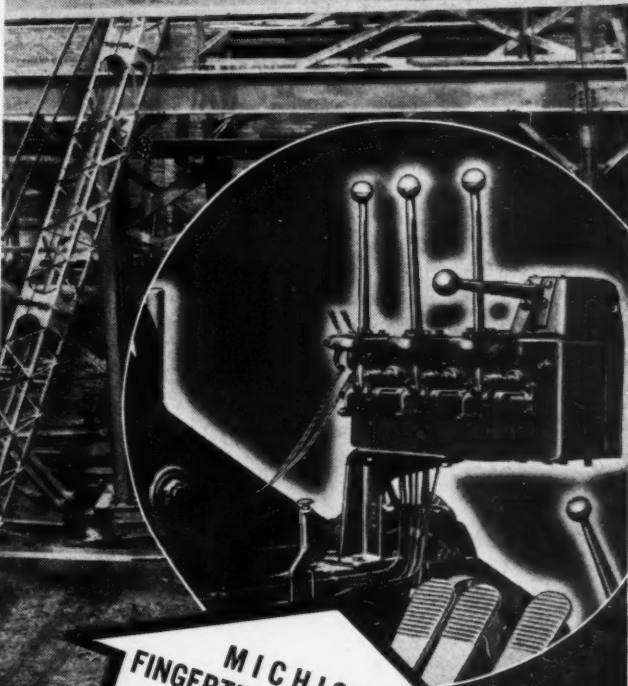
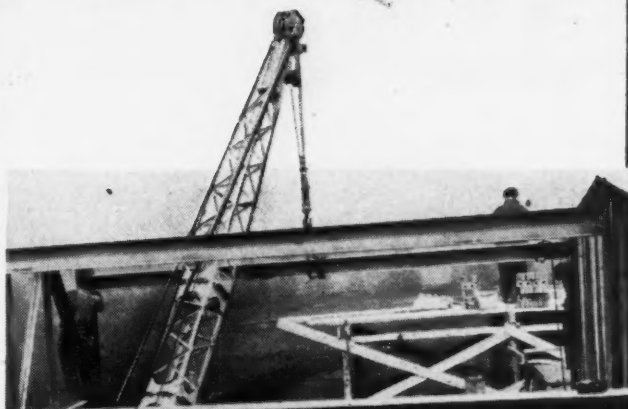
- 5 Model 80-D, 2½-cu. yd. Northwest shovels
- 1 Model 120-B, 5-yd. Bucyrus Erie electric shovel with diesel-electric generating set
- 15 End-dump, 10-yd. Euclid trucks
- 10 End-dump 12-cu.yd. Mack trucks
- 12 Side-dump, 16-cu.yd. Athey Forged Trak Trailers, used in tandem, with Caterpillar D-7 prime movers
- 4 Caterpillar D-8 bulldozers
- 2 GMC 2½" cu.yd. utility trucks
- 1 Stake body cargo truck
- 20 Wagon drills
- 15 Jackhammers
- 4 Churn drills, 6-in. bits
- 315 cfm. of air capacity per wagon drill

Apra Breakwater Equipment on Order, July 1945

- 20 Mack end-dump 40-ton trucks
- 20 Mack and Euclid 10 to 15 cu.yd. end-dump trucks
- 12 Air compressors, 315 cfm. cap.
- 20 Wagon drills
- 4 Caterpillar D-8 tractors
- 3 Northwest 80-D shovels
- 2 Motor graders
- 2 Core drills
- 20 Low bed trailers with power units
- 3 Lima cranes, 3½-cu.yd. cap., or 21 tons at 30-ft. radius

STEEL GOES UP F-A-S-T-E-R WITH A MICHIGAN MOBILE CRANE....

To "make time" on steel-setting jobs you need a crane that can ease cumbersome girders and structural sections into position with speed, accuracy and safety. . . MICHIGAN Mobile CRANES are outstanding for operating ease, stability for handling heavy loads with maximum safety, truck mobility, and many other profit-earning features Construction activity is due to greatly increase in the near future—have **you** modern, cost-cutting equipment which will enable you to **profitably** handle **your** share? It will pay you to seriously consider MICHIGAN Mobile CRANES and SHOVELS—available in 6 to 12 ton and $\frac{3}{8}$ and $\frac{1}{2}$ yard capacities, convertible to all standard attachments. . . . Get the facts—write for Bulletin CM-105 today.



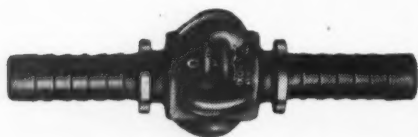
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FINGERTIP AIR CONTROLS**
Fast, smooth, positive. Simple,
trouble-free, time-tested. Peak op-
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after hour—operator fatigue re-
duced to a minimum.

MICHIGAN

POWER SHOVEL COMPANY
BENTON HARBOR MICHIGAN

*Quick... Safe...
Interchangeable*

**FOR ALL TYPES OF
PNEUMATIC TOOLS**



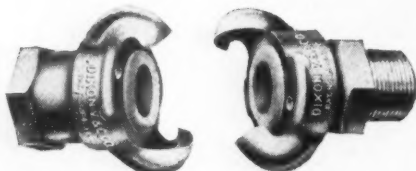
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Quick-Acting, Universal Type

HOSE COUPLING

With Auxiliary Locking Arrangement

The "Air King" is a quick-acting coupling with a reputation for efficiency and safety on all indoor and outdoor air hose jobs. Locking heads are identical for all sizes of hose and threaded pipe ends, permitting coupling of any two sizes of hose, or hose to pipe, within the "Air King" size range, without adapters, bushings or extra fittings. Made of malleable iron or bronze.



Threaded I.P.T.
Female End

Threaded I.P.T.
Male End

Shanks of hose ends are long, amply corrugated and smoothly finished, permitting easy insertion in the hose and providing a tight grip under clamp pressure.

A special locking arrangement, for services of a hazardous nature or those involving excessive vibration, makes it impossible for the coupling to come apart until manually released.

Sizes: Hose Ends— $\frac{3}{8}$ ", $\frac{1}{2}$ ", $\frac{5}{8}$ ", $\frac{3}{4}$ " and 1";
Pipe Ends— $\frac{1}{4}$ ", $\frac{3}{8}$ ", $\frac{1}{2}$ ", $\frac{3}{4}$ " and 1".

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of Mechanical Rubber Goods.**

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VALVE & COUPLING CO.

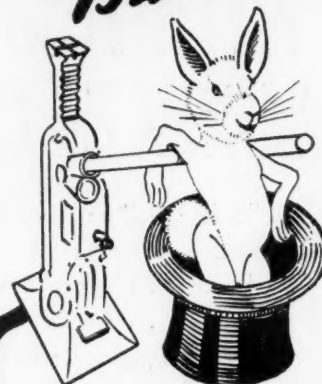
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*This Jack Does
Everything
But Talk*



Incomparable versatility makes the Simplex No. 310A Emergency Jack a profitable piece of equipment in the construction field, where it handles a surprising range of jobs. Lifts vertically and lifts or pushes from any angle. Tilts on broad, stable base. Lifts on cap, corrugated toe or adjustable shoe that engages in cap, or from any intermediate height by using the chain as a sling. Double lever socket provides for close quarter operation. Ask your supply house.



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LEVER - SCREW - HYDRAULIC
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200 WEST CHICAGO AVENUE
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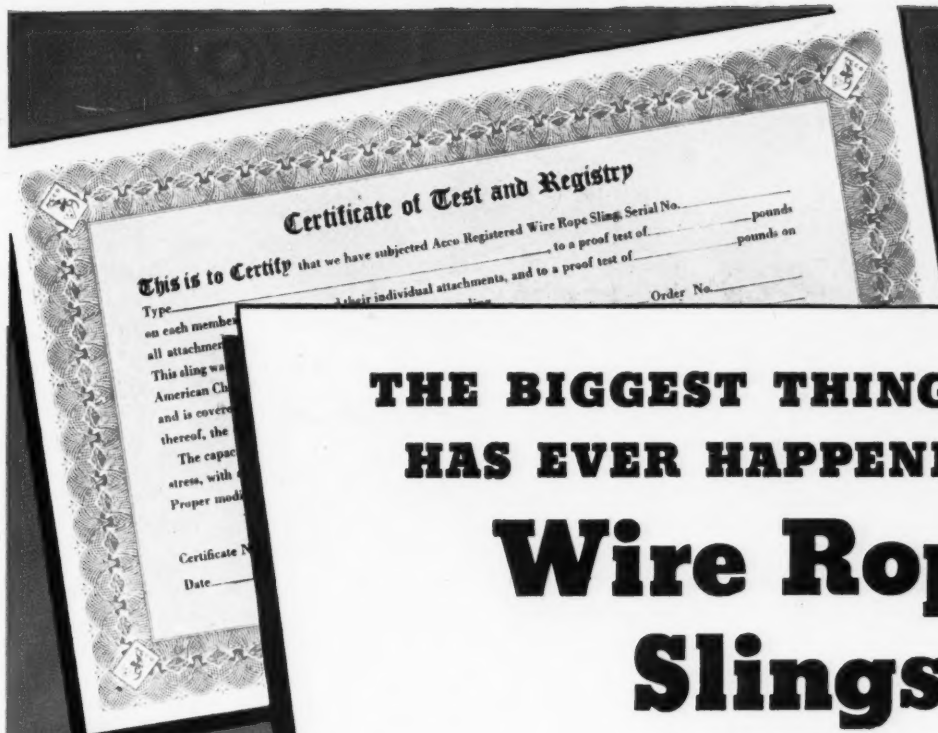
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BURBANK, CALIFORNIA**

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by AMERICAN CABLE

● Now you can buy a wire rope sling that has been proof-tested and registered for known strength and safety. Never before has it been possible to do this.

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ACCO "Registered" Service helps you select the right wire rope sling for your particular job—then registers and identifies its pre-determined strength.



ACCO

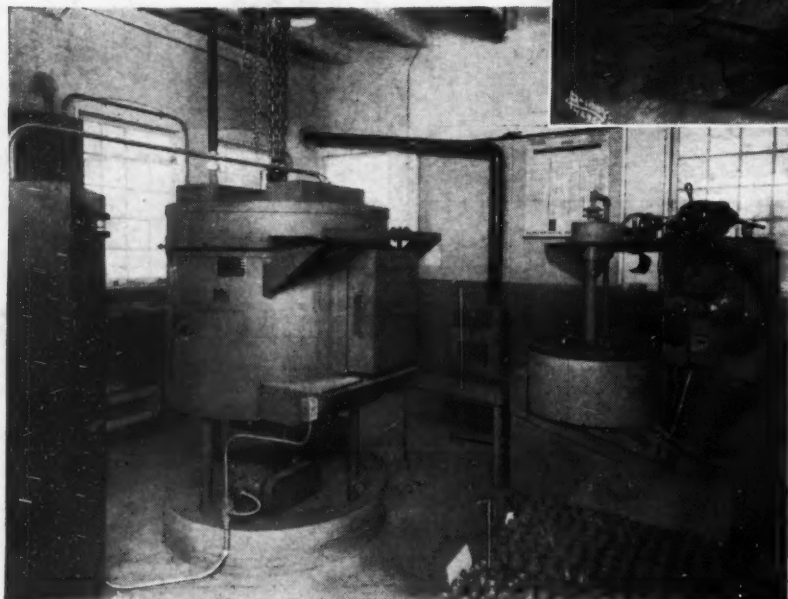
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TRADE-MARK REG. U. S. PAT. OFF.
ROCK BITS

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